

1970, 1971

DIAPYCNES, C. 1971. 1972. 1973. 1974.
ANALYSIS OF THE SYSTEM
(UNIVERSITY) - FACTS IN THE SYSTEM
AND EFFECTS OF THE SYSTEMS CENTER.
[E. 1971. 1972. 1973. 1974.].

1971. 1972. 1973. 1974. 1975. 1976.
1977.
1978. 1979. 1980. 1981. 1982.

University Microfilms, A XEROX Company Ann Arbor, Michigan

UNIVERSITY BY

MAJOR GILLIAN STRAUS

1970

ARTS AND SCIENCES IN THE STUDIUM (UNIVERSITY)
OF PADUA IN THE THIRTEENTH AND FIRST HALF
OF THE FOURTEENTH CENTURY

by

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A dissertation submitted to the
Graduate Faculty in History in partial
fulfillment of the requirements for the
degree of Doctor of Philosophy,
The City University of New York.

1970

This manuscript has been read and accepted for the Graduate Faculty in History in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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ACKNOWLEDGMENTS

This study was first suggested to me by Professor Pearl Kibre of Hunter College and the Graduate Center of The City University of New York. At every stage of the work I have benefited by her constant advice and encouragement. My debt to Professor Kibre cannot adequately be expressed by any conventional formula of thanks. Such merits as this study may have are due to her inspiration; its errors are my own.

I should also like to express my gratitude to Professors P. O. Kristeller, of Columbia University, and Marshall Clagett, of the Institute for Advanced Study at Princeton, who were kind enough to give me the benefit of their advice, and to Mademoiselle Marie-Thérèse d'Alverny of Paris and Professor Ernest Moody of the University of California, who have corresponded with me on the subject of this study. In Italy, I am especially grateful to Professor Paolo Sambin of the Istituto di Paleografia e Diplomatica of the University of Padua and to Dottoressa Lucia Rossetti of the Archivio Antico of the University, both of whom offered many helpful suggestions. I wish to thank, too, all those who helped me, in Padua, at the Biblioteca Universitaria, the Biblioteca Antoniana and the Biblioteca del Seminario Vescovile and, in New York, at the Rare Book Room of the New York Academy of Medicine, the

New York Public Library, the Special Collections of Columbia University, the Pierpont Morgan Library and the libraries of The City University.

Finally, it is conventional but nonetheless true to say that my greatest debt is to my husband, without whose stimulating interest in my research and toleration of my domestic inadequacies this work could not have been written.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
II. GRAMMAR, RHETORIC AND LOGIC	45
III. ARITHMETIC, GEOMETRY, MUSIC, AND ASTRONOMY	114
IV. NATURAL SCIENCES AND METAPHYSICS	207
V. MEDICINE AND SURGERY	280
CONCLUSION	339
BIBLIOGRAPHY	441

NOTE

In the present study personal names are usually given in their Italian form. This policy has, however, been departed from in the case of personages generally better known under the English or Latin version of their names.

CHAPTER I

INTRODUCTION

relatively little is known of the study of the arts and sciences in the schools of Padua in the thirteenth and early fourteenth centuries. Yet it is to this period that one must turn for the origins of that emphasis upon natural science, and, in particular, that association of astronomy, medicine and natural philosophy that distinguished the University of Padua in the centuries of its greatest fame, when Copernicus and Vesalius, Galileo and Harvey graced its schools. Moreover, Professor J. M. Randall¹ has claimed that significant contributions to the development of scientific method grew from the critical discussion of Aristotelian logical analysis in its application to natural science in the schools of Padua in the early fourteenth century. The determination of the arts and sciences studied in the schools of Padua in the period before 1350 therefore holds considerable interest for the historian, and is the object of the present study. The intention is neither to analyze the ideas of individuals nor to look for the pre-history of later philosophical or scientific concepts, but rather to describe, insofar as is possible, an intellectual milieu. For, in Sir Maurice Powicke's words, the historian of the universities "must live in the valley and mix with the crowd before he follows the great teacher to the heights."² It is hoped therefore, that

I-2

the present work may throw some light, not only upon the specific subjects studied but also upon the general intellectual environment of the schools of Padua in the Middle Ages.

The association of medicine with mathematical and physical science and with philosophy at Padua appears to have grown out of the ancient tradition linking medicine and the liberal arts. This tradition, which can be traced back to Varro, who wrote in the second century B.C.,⁵ was reflected in the curriculum of the schools of the medieval studium of Padua. There, as will be demonstrated below, medical students were, in the thirteenth and early fourteenth centuries, required to study all seven liberal arts, including the mathematical arts of the quadrivium, and natural philosophy, as well as medicine.

At Padua, as at other Italian university centers in the Middle Ages, the association of arts and medicine was fully incorporated into the formal organization of the academic community. Doctors of arts and doctors of medicine were joined in the same college;⁶ scholars of arts and scholars of medicine were part of the same university;⁷ degrees were granted in "arts and medicine."⁸ Thus the Paduan faculty of arts, instead of being, as in the university centers of northern Europe, merely a preparatory stage through which aspirants to the higher faculties must pass, was itself indissolubly linked with a higher faculty, namely medicine. These facts are well known in terms of the institutional history of Padua and other Italian studia but their implications for intellectual history have been less thoroughly explored, especially

I-3

as regards the thirteenth and early fourteenth centuries. The institutional link between arts and medicine at Padua was perhaps to some extent the creature of political necessity; that is, the physicians and artists may have banded together in the face of the all-powerful faculty of law, which dominated the schools of Padua until the very end of the fourteenth century.⁷ Nonetheless, such association would not have been feasible without intimate connections between the content of study in the arts and in medicine. The precise nature of these connections remains to be investigated.

The questions to be answered relate both to the content of the arts curriculum and to the relative importance attached to the various liberal arts. It would be desirable to ascertain, for example, whether the amount of attention paid to each of the various arts was determined by the needs of medical education or by other criteria. As regards the subjects of the trivium, a point of significance is the role of logic in the formation and transmission of medical theory. Of particular interest is the position of the arts of the quadrivium in general, and the close relationship of medicine with at least one of the mathematical arts, namely astronomy. The place of Aristotelian natural philosophy in the arts curriculum of Padua before 1390 also requires illumination, especially as regards the thirteenth century. What was the effect of the reception of the Aristotelian works on natural science and metaphysics in schools dominated not by theologians, as at Paris, but by physicians and lawyers? Lawyers as well as physicians studied liberal arts in the early

stages of their education, and the type and extent of instruction received by prospective law students in the faculty of arts merits investigation on its own account. For the curriculum in medicine itself, interest attaches to the relationship of theoretical and practical elements in medical teaching and to the use of scholastic methods of argument and exposition in medical texts.

The present study constitutes an attempt to explore some of the problems just suggested by a determination of what was actually taught at Padua in each of the seven liberal arts, in natural science, and in medicine in the thirteenth and first half of the fourteenth century. The content of the teaching in the arts and sciences, unfortunately, cannot be ascertained from the archival sources from which the general history of the studium is, in the main, to be drawn.⁸ For Padua, documentary evidence concerning the formal curriculum in arts and medicine before 1350 appears to be simply nonexistent. The earliest known statutory list of required texts, which concerns medicine alone, is contained in the statutes of the University of Arts and Medicine compiled in 1465.⁹ These statutes undoubtedly incorporate some earlier material but cannot, obviously, be used with any great confidence as a source for the thirteenth century. None of the medieval statutes of any of the other corporations of the studium of Padua cast any light on the problem. Statutes of the jurist universities¹⁰ and of the College of Doctors of Arts and Medicine¹¹ survive from the first half of the fourteenth century. From the

I-5

later fourteenth century there are also statutes of the College of Jurist Doctors¹² and a series of acts of the College of Doctors of Arts and Medicine;¹³ but none of these documents contain any mention of prescribed texts in arts or medicine. The same is true of the communal statutes of the city of Padua in the thirteenth and fourteenth centuries.¹⁴ A few wills and inventories naming books possessed by masters or scholars of Padua survive from the later fourteenth and fifteenth centuries,¹⁵ but even this type of archival evidence appears to be lacking for the earlier period.¹⁶

However, even if it were possible to reconstruct the formal curriculum in its entirety from statutory or other archival evidence, such a reconstruction would not necessarily provide an adequate picture of the scope of thought and teaching in the Paduan faculty of arts and medicine. Course listings in modern university catalogues are, after all, documents of only limited value as far as information about the intellectual milieu is concerned. What is needed for any real understanding of what was taught in arts and medicine at the medieval studium of Padua is not merely a list of the names of required texts or topics, but an over-view of supplementary and interpretative works. For this, it is necessary to turn to the writings of doctors who taught the subjects in question in the schools of Padua in the given period. From these works, and perhaps only from them, a comprehensive idea of the body of knowledge transmitted can be gleaned.

In addition, relevant works produced in Padua by authors who were not themselves necessarily formally enrolled as either regent or teaching masters or scholars in the schools cannot be left out of account. It is, to say the least, highly unlikely that the

1-6

intellectual life of a city the size of medieval Padua, estimated by a recent writer to have had a population of about 35,000, could in 1320,¹⁷ ever have been rigidly compartmentalized. In a population of that size, it seems probable that practically all mature intellectuals would have been familiar with one another's work. Professors, scholarly members of religious houses and intellectual laymen, such as the poet and politician Albertino Mussato (1262-1299) were, it would seem reasonable to suppose, all mutually acquainted and, to some extent at least, mutually influential. Thus any Latin works touching on arts and medicine produced at Padua in the period between about 1200 and 1300 may be regarded as potentially useful sources of information concerning intellectual developments in the schools. For example, the question, which has been much discussed by historians of the University of Padua, as to whether Bruno Longoburgo of Calabria, who wrote two works on surgery at Padua in the mid-thirteenth century, was, or was not, a professor is of no relevance in terms of the present study.¹⁸ The fact that his works were written at Padua and used there by scholars is in itself enough to recommend them as sources.

It will be evident from the foregoing remarks that it is not the object of the present work either to trace the general history or to describe the administrative organization of the Paduan studium. Both tasks have, in any case, already been undertaken by competent authorities,¹⁹ and there appears to be little fresh information regarding these topics to be extracted from the rather scanty thirteenth and early fourteenth century sources.²⁰

Nonetheless, some account of general developments at the studium before 1350 is necessary as background to the intellectual history of the Paduan schools in the period. This background the following brief narrative is intended to supply.

Schools of law and of grammar probably existed in Padua in the twelfth century or even earlier,²¹ but the traditional date for the founding of the studium of Padua is 1222. In that year, according to a contemporary chronicle, "the studium of Bologna was transferred to Padua."²² Although this statement is clearly an exaggeration, in that Bologna continued to function as a university center, a substantial migration of masters and students to Padua appears to have taken place at that time.

The presence of masters and students at Padua in the 1220s is attested by several contemporary references. Jordan of Saxony, second general of the Dominican order, preached at Padua in 1223 and converted a number of scholars, among them, apparently, students of arts.²³ In 1226 a work on rhetoric was solemnly read and approved in the Cathedral of Padua in the presence of the apostolic legate, the bishop, the professors of civil and canon law and all the doctors and scholars residing in Padua.²⁴ In 1228 representatives of the students of Padua negotiated a contract with the commune of Vercelli, providing for a new migration of students to the latter city.²⁵ Whether the contract was ever wholly or partially put into effect is a question that, after much discussion, still remains unsolved.²⁶ The provisions of the contract, however, throw some light on conditions in the schools of Padua at the time it was made. Particularly note-

I-8

worthy is the clause under which it is agreed that five hundred houses in Vercelli shall be made available for lodgings for the students, a figure that suggests that the number of students in Padua at the time the contract was made was probably at least two thousand.²⁷ They were divided into four associations or corporations: French, Italian, German, and Provençal, each with its own head.²⁸ The French group included Norman and English students in its membership, and the Provençal group included Catalans and Spaniards.²⁹ Another clause of the contract provides that the Commune of Vercelli should pay salaries to one theologian, three professors of civil law, four professors of canon law, two professors of medicine, two professors of logic, and two professors of grammar.³⁰ This provision does not, as H. Denifle pointed out, reflect the distribution of professorial chairs at Padua, since there was no public teaching of theology at Padua until 1205.³¹ The contract cannot therefore in itself be construed as firm evidence that arts and medicine were taught at Padua in 1228, although this is possible.

Whether or not the contract with Vercelli was put into effect, some scholars evidently remained at Padua. Jordan of Saxony again preached in Padua about 1231. Among his converts on that occasion was a Hungarian who was "highly skilled in arts."³² Moreover, an early life of St. Anthony of Padua, who died in 1231, speaks of processions of crowds of scholars to his tomb in that year.³³ In 1237, however, Padua fell into the hands of Ezzelino da Romano, a lieutenant of the Emperor

Frederick II. Ezzelino and the members of his family earned a classic reputation for cruelty and tyranny, and under their regime the schools of Padua appear to have been either suppressed entirely or extremely restricted in function.³⁴ But with the expulsion of Ezzelino from Padua in 1256 and the total collapse of the last vestiges of power of the da Romano in 1260,³⁵ the stage was set for a revival and reorganization of the schools. A fresh migration of students from Bologna in 1262 gave further impetus to the development of the Paduan studium.³⁶

As a result, the studium was in effect founded afresh between the years 1259 and 1264. In that period, as the following discussion will demonstrate, the five academic corporations or associations of medieval Padua, that is two universities of law, a university of arts and medicine, a college of doctors of law and a college of doctors of arts and medicine, appear to have been either created or reactivated. At about the same time the communal government began to enact legislation providing legal protection for foreign scholars in Padua and securing them a variety of privileges concerning housing, taxation, and loans from public funds.³⁷ A formal pact guaranteeing certain scholarly privileges was negotiated between the city and the scholars in 1262.³⁸ The commune also undertook to pay the salaries of professors of canon and civil law.³⁹ Finally, in 1264 the newly reorganized academic community of Padua obtained recognition from the Pope. In that year a bull of Urban IV (1261-1264) confirmed the existing practice established by university statute, whereby graduating students were examined by the doctors of the schools in the presence of the Bishop, who then granted the license to

teach to successful candidates.⁴⁰ Thereafter, although for a time the schools continued to be dependent upon migrations from Bologna for some of their students and masters,⁴¹ Padua developed as a major university center in its own right. Initially primarily known for legal studies, the schools of Padua in the course of the fourteenth century also became widely celebrated for the teaching of medicine.⁴²

The organization of the schools of Padua, created in the years immediately following the fall of Ezzelino da Romano, appears to have remained substantially unchanged for much of the fourteenth century as the following account of the principal academic institutions and authorities will show.

The universities of foreign scholars of law appear to date from about 1260. In that year the first set of statutes of two universities, of ultramontane and cismontane students respectively, are said to have been compiled.⁴³ Each university had included both civilians and canonists among its members and, it would appear, may have included doctors as well as students.⁴⁴ Each had its own rectorship although the two offices were in some years occupied by the same man.⁴⁵ No mention is made of the division of the universities into nations in 1260, but by 1331 there were nine ultramontane and ten cismontane nations.⁴⁶

The powers of the jurist universities were, at any rate on paper, considerable. They claimed the right to make their own statutes, to elect and be ruled by their own rectors, and to elect professors to the salaried chairs maintained by civic funds.⁴⁷ The professors elected had to swear obedience to the rectors.⁴⁸

But the municipal government retained the right to veto university statutes;⁴⁹ and, after 1331 the professors formally elected by the scholars were nominated by municipal officials appointed to supervise the universities.⁵⁰ In practice, too, professors were on occasion directly appointed by the civic government.⁵¹ Moreover, while the jurist university statutes of 1331 prescribe regulations for the examinations for the degree of doctor of laws,⁵² there seems little doubt that effective control of these examinations remained in the hands of the College of Jurist Doctors, whose members conducted them.⁵³

The College of Jurist Doctors included in its membership both professors teaching law in the schools and other doctors of law resident in the city. The non-teaching members were usually Paduan civic judges.⁵⁴ The College appears to have been effectively founded shortly before 1260, although a document compiled in 1382 claims to record the names of members beginning in the year 1135.⁵⁵ Only six of the names listed can, however, be placed in the period before 1256.⁵⁶ Of these six, two are the names of bishops of Padua who were learned in canon law in the late twelfth and early thirteenth centuries; three are names of doctors claimed by A. Gloria as professors in the period between about 1210 and 1235. The sixth name is that of the celebrated Uguccio of Pisa (d. 1210). There is apparently no other evidence to associate Uguccio with Padua and the reality of his presence there is somewhat doubtful.⁵⁷ No names at all are mentioned that can be associated with the period of the tyranny of Ezzelino. For the longer span of years

between 1256 and 1349, however, some eighty names are given. It seems probable therefore that, while some form of association of learned lawyers may have existed at Padua in the late twelfth and early thirteenth centuries, the College of Jurist Doctors properly so called was not established until the late 1250s. The membership of the college was restricted to twelve until 1349, when it was increased to twenty.⁵⁸ The College of Jurist Doctors probably exercised a good deal of control over the masters teaching law in the Paduan schools and, in its capacity as an examining body, over the student members of the jurist universities.

The earliest mention of a university of arts seems to date from 1262. In that year the Chronicle of Rolandino of Padua was read in the presence of the regent masters of arts and the societate laudabili bacalariorum et scolarium liberalium artium.⁵⁹ It will be noted that no mention is made of the membership in the association of students of medicine but since by 1262, as will shortly be demonstrated, professors of medicine and the arts were already associated in the same college, it is probable that the corresponding university also encompassed both fields at that time. It is not known if the University of Arts and Medicine was divided into nations in the thirteenth and first half of the fourteenth centuries. In the fifteenth century it consisted of seven nations, only one of which was ultramontane.⁶⁰ Paduan citizens were excluded from the University⁶¹ which, like the jurist universities, was in origin a protective association of foreign scholars.

In the period before 1350 the University of Arts and Medicine remained entirely subordinate to the jurist universities.⁶² The members of the University of Arts apparently did not have the formal right to elect professors or even their own rector at this time. With the growth and increasing distinction of the Paduan medical schools, it was not possible that the scholars in arts and medicine should rest content with this arrangement for long, and by the middle of the fourteenth century, it probably already seemed an anachronism. In 1360 a sharp dispute, which had to be resolved by the intervention of the Bishop of Padua, broke out between the University of Arts and Medicine and the jurist universities. As a result of the bishop's mediation the jurists grudgingly recognized the rights of the University of Arts and Medicine to elect a rector and professors. Even then the artist rector had to swear obedience to the jurist statutes before the jurist rectors, and students in arts and medicine had to pay a fee to the officers of the jurist universities upon graduation. It was not until 1399 that Francis of Carrara finally negotiated the complete separation of the artist and jurist universities and the total independence of the former.⁶³ Moreover, by the 1360s and probably before, members of the University of Arts and Medicine had to swear obedience to the College of Doctors of Arts.⁶⁴

There appears to be no trace of any College of Doctors of Arts and/or Medicine at Padua before 1259. It is fairly clear that no such college could have existed in 1226 when, as already noted, a work on rhetoric was formally approved by the professors of civil and canon law, apparently without any participation by

professors of arts acting as a group.⁶⁵ The first indication of the existence of a doctoral college of arts is perhaps to be found in a Paduan communal statute of 1259 which grants immunity according to the law (that is, probably, from taxation and military service) to masters of grammar who were conventati et approbati.⁶⁶ The term conventus was used in Italy to signify one who had obtained the doctorate through a formal public graduation ceremony in the schools;⁶⁷ the use of the expression probably therefore implies the existence of a degree-giving college or corporation of masters of arts, or, at any rate, of grammar. It is however possible that the status of master of grammar may have been formally conferred upon successful students by individual masters, as was the case with rhetoric at Bologna in the 1220s.⁶⁸

It appears probable that the regent masters who formally authenticated the chronicle of Rolandino in 1262 were members of a doctoral college. If so, doctors of arts and doctors of medicine were already united in a single college, for their numbers were made up of three doctors of medicine and natural science, one of logic, and six of rhetoric.⁶⁹ The ten professors named by Rolandino may have constituted the complete college in 1262, since its membership was limited to twelve until 1377.⁷⁰ On the other hand, if an analogy is drawn with the membership of the College of Jurist Doctors, it is possible that the membership of the College of Arts may also have included non-teaching doctors of medicine. Members in this category would presumably be drawn from among the leading

physicians of the city. Such, for example, may have been Antonio da Curtarolo Padovano, a physician who was provost of the College of Doctors of Arts in 1369, but who does not appear to have been a professor.⁷¹ Despite the presence of both physicians and doctors of liberal arts in the college, it appears to have been called simply the collegio artistarum for much of the period before 1350. It is so termed, for example, in the record of the doctorate in medicine of Aymericus de Polonia in 1307. The degree was granted in the presence of two doctors of laws, the provost of the collegio artistarum and members of the college who included two physicians, two doctors of logic and an unspecified number of doctors of grammar.⁷² In 1330, however, when the earliest known statutes of the college were compiled, the association was entitled collegio artistarum et medicorum.⁷³

The powers of the College of Doctors of Arts and Medicine appear to have been fairly extensive, or at any rate less restricted than those of the corresponding university. As A. Gloria has noted, the college attempted to command the obedience of, and made regulations affecting, not only its own members but all professors of arts and medicine and the entire University of Arts and Medicine.⁷⁴ Examinations for the degree of doctor of medicine, doctor of arts, or of the two simultaneously were conducted by members of the college.⁷⁵ In the period before 1360, however, doctors of law attended examinations in arts and medicine,⁷⁶ which suggests that the jurist doctors attempted to exercise the same supervision over the doctors in arts and medicine that the jurist universities

exercised over the University of Arts and Medicine. In 1306, an episcopal decree provided that all masters in grammar, logic and medicine coming to Padua in order to lecture in the schools should swear obedience to the provost of the collegio artistarum and its statutes and should submit to examination by the college.⁷⁷ Whether the college had any jurisdiction over the magistri non conventati, who apparently taught in city grammar schools with the approval of the civic government,⁷⁸ is not clear. However, as Professor Kibre has pointed out, the members of the College of Doctors of Arts and Medicine did not control the licensing of medical practice in Padua. This was the task of the fratales, or guild of physicians. But since the professors of medicine were members of the fratales along with the other physicians of the city, they were no doubt able to exercise a good deal of influence on the licensing procedure.⁷⁹

While the colleges of doctors and the jurist universities of Padua were, in the period before 1350, in theory and largely in practice autonomous corporations, they were by no means wholly independent of the ecclesiastical and civic authorities. The bishops of Padua had constituted themselves patrons and protectors of scholars long before their authority over the schools was formally recognized by the bull of Urban IV in 1264. It will be recalled that two bishops who were learned in canon law were among the earliest members of the prototype of the College of Jurist Doctors; furthermore, Bishop Jordanus of Padua is credited by A. Gloria with playing an important part in encouraging the migration of scholars from Bologna to Padua in 1222.⁸⁰ The tradition of episcopal patronage continued in the first half of the

I-17

fourteenth century in the long episcopates of Pagano della Torre (1302-1319) and Ildebrandino or Ildebrando Conti Romano (1319-1352), both notable as patrons of the schools.⁸¹ After 1264 the bishop of Padua was, ex officio, chancellor of the studium and the formal source of all licentiates and doctorates granted therein. Quite frequently the bishop delegated his duties as regards the studium to a specially appointed episcopal vicar who then assumed the title of chancellor.⁸² As already noted, when granting degrees, the bishop or his vicar relied upon the judgement of the examining professors as to the suitability of the candidate.⁸³

The ultimate ecclesiastical authority was, of course, the Pope, but there are only a few recorded instances of papal intervention in the affairs of the schools of Padua in the period with which the present study is concerned. As already noted, the studium gained papal recognition from Urban IV in 1264. In 1289 Pope Nicholas IV briefly suspended or threatened to suspend the operation of the schools of Padua as a punishment for recalcitrance on the part of the Paduan commune.⁸⁴ A bull issued by Clement VI in 1346 confirmed the bull of Urban IV and all the rights and privileges of bishop, doctors and scholars mentioned therein. Pope Clement's bull described Padua as a studium generale, where the teaching of civil and canon law and all other faculties except theology had been authorized from time immemorial.⁸⁵

The civil government of Padua--that is, from 1250 until 1318, the officers of the commune, and after 1318 the princes of the house of Carrara--exercised considerable control over the academic

institutions of the city. In 1261 municipal supervision extended to the point of prescribing what books were to be lectured on by the publicly salaried professors of law.⁸⁶ It has already been pointed out that after 1331 the professors occupying the chairs of canon and civil law were effectively appointed by the municipality, despite the claims of the jurist universities to elect them.⁸⁷ The municipality also paid the salaries of professors of arts and medicine and presumably exercised a similar control over their appointments. Peter of Abano, who taught philosophy, medicine and astronomy, was in receipt of a public salary by 1311.⁸⁸ In 1321 the civic administration also undertook to pay the salaries of three professors of medicine, one of surgery, one of philosophy, one of logic, and one of grammar.⁸⁹ Quite probably the salaried professors of arts and medicine were as a general rule directly appointed by the civil authorities in the period before 1360. It has been shown that they were not elected by the University of Arts and Medicine, and it seems unlikely on the face of it, that the jurist universities could have established a claim to choose professors of medicine, or even of arts. There appears to be no record in the thirteenth or early fourteenth centuries of any claim by either the colleges of doctors or the bishop to appoint or elect professors to the publicly salaried chairs.

Paduan citizens were legally debarred from publicly salaried academic positions, probably in order to prevent nepotism on the part of local magnates. This prohibition, first found in a municipal statute of 1276,⁹⁰ does not always appear to have been

honored. It was repeated by the compilers of the jurist statutes of 1331, who seized the opportunity to denounce corrupt practices in the appointment of professors in no measured terms. They wrote bitterly of the election of "deceivers, or more truly destroyers [who] since such men cannot succeed by bribery in persuading the students to elect them, spread their money among the citizens and the members of the Paduan council in order to secure election."⁹¹

Nevertheless, even if the diatribe of the jurists was on that occasion justified, governmental intervention in scholarly affairs at Padua in the period before 1350 was on the whole benevolently intentioned. The fiscal and other privileges granted to scholars were extensive and were continuously maintained both under the government of the commune and under that of the princes of Carrara. This is apparently the case despite the fact that the schools, like everything else in Padua, were adversely affected by the war with Can Grande della Scala of Verona and the internal disturbances that accompanied the transfer of power from the commune to the Carrara family in the period from about 1312 to 1328.⁹² Once the Carrara were established, however, they proved to be notable patrons of the schools, not only confirming and extending scholarly privileges granted by the communal government, but also actively seeking to recruit students from other studia and to improve academic standards.⁹³ The studium generale of Padua was, after all, one of the principal ornaments of the city; moreover, its members played an important part in the Paduan economy. These

facts were well understood by the city's rulers, whether communal or seignorial.

Details of the course of studies at Padua in the thirteenth and early fourteenth centuries are hard to come by, but such information as is available suggests a curriculum similarly organized to that of Bologna. A. Gloria suggested that law students normally took six years to obtain a degree at Padua and medical students five.⁹⁴ Law students had presumably already studied arts, although not necessarily at Padua. Studies in arts and medicine were apparently sometimes pursued consecutively and sometimes simultaneously.⁹⁵ It does not appear to be known how long the arts course at Padua lasted in the period under review, or whether prospective lawyers and prospective physicians were expected to study arts for the same length of time.⁹⁶

At Padua as at other medieval studia lecturers in both law and medicine were categorized as either "ordinary" or "extraordinary."⁹⁷ Ordinary lecturers were professors of some standing who delivered authoritative commentaries on the prescribed texts in the morning hours. Extraordinary lecturers, who were considered to have less seniority, gave either additional lectures on the same texts or expounded supplementary works. Their classes were usually scheduled in the afternoon. The difference between the two categories of lecturer is clearly expressed in the statutes of the Paduan University of Arts of 1465, which demanded of an ordinary lecturer in medicine that he should have either previously

held another similar chair or had three years experience of medical teaching as an extraordinary lecturer; but an extraordinary lecturer had only to have passed the public and private examinations and could, moreover, be appointed to lecture in medicine, philosophy, astrology or mathematics indifferently.⁹⁸ A further category of teachers was that of the repetitores. These were apparently advanced students who gave a simple line by line explanation of required texts.⁹⁹ The term "bachelor" is occasionally used in Paduan sources before the mid-fourteenth century, but seems to have been simply a title applied to advanced students, not the name of a formal degree.¹⁰⁰

The degree of doctor of canon or civil law, of medicine, of surgery,¹⁰¹ or of arts,¹⁰² or of arts and medicine,¹⁰³ was granted following private and public examinations. Both examinations took place before the appropriate college of doctors and the bishop or his vicar. The candidate, who was presented by a "promotor" chosen from among the doctors, had to argue on pre-selected topics or "puncti". A scholar who passed the private examination received his license (that is, to teach) from the bishop or his vicar; shortly afterwards the new licensee proceeded to the public examination, or conventus, successful completion of which was rewarded by the doctorate.¹⁰⁴

What exercises other than the two examinations were required of students in the thirteenth and early fourteenth centuries has not been determined. Since in the fifteenth century the completion of prescribed courses, service as a repetitor, and

participation in public disputations were exacted, it is probable that these obligations also applied in the earlier period.¹⁰⁵

Doctors of law were required to hold public disputations at least once a year by the jurist statutes of 1331.¹⁰⁶

Such, in brief, were the external conditions affecting studies in the arts and medicine at Padua before 1350. It is now time to turn to the content of these studies.

FOOTNOTES TO CHAPTER I

1. See J. H. Randall, Jr., "The Development of scientific method in the school of Padua," Journal of the History of Ideas, I (1940), 177-206. Professor Randall discusses the contribution of Peter of Abano (ca. 1250-ca. 1316, teaching at Padua ca. 1306-ca. 1316; for his life and works see below, pp. 97-99, note 88), but gives little attention to the milieu which produced, in the early fourteenth century, a scholar like Peter of Abano, who combined philosophical, medical and astronomical interests in approximately equal proportions.

2. F. H. Rashdall, The Universities of Europe in the Middle Ages, ed. F. M. Powicke and A. B. Emden (new edition, 3 vols. Oxford: Oxford University Press, 1936), Introduction by F. M. Powicke, I, xxv.

3. Varro (fl. 116-127 B. C.) wrote treatises on a series of nine liberal arts: the usual seven plus architecture and medicine (Paul Abelson, The Seven Liberal Arts [New York: Teachers College, Columbia University, 1906, reprinted Russell and Russell, 1965], p. 6). By the time of Isidore of Seville, medicine was no longer generally regarded as one of the liberal arts, probably because it was not so designated in the influential De nuptiis Philologiae et Mercuriae of Martianus Capella (fifth century A.D.); it was still generally associated with the arts, however, for Isidore wrote "Some ask why the art of medicine is not included among the other liberal disciplines. It is because whereas they embrace individual subjects, medicine embraces them all." Isidore went on to explain that the

F-I-2

physician should be trained in grammar, rhetoric, dialectic, arithmetic, geometry, music and astronomy (William D. Sharpe, Ed. and trans. "Isidore of Seville: The medical writings," Transactions of the American Philosophical Society, New Series, LIV, part 2 (1964), p. 64. The passage is taken from Isidore's Etymologiarum sive originum, 5.13.1.).

4. See p. 14.

5. See p. 12.

6. Of the sixty known members of the College of Doctors of Arts and Medicine in the years 1367-1378 and 1391-1398, twenty-eight had degrees in arts and medicine; thirteen had degrees in medicine alone and seven in arts alone. The type of degrees held by the remaining twelve members is not mentioned in the document. The list of members is printed in Andrea Gloria, Monumenti della Università di Padova (1318-1405) (2 vols., Padua, 1888), I, 78-81, hereafter cited as Monumenti, 1318-1405. Gloria compiled the lists from the earliest surviving volumes of the acts of the College of Doctors of Arts and Medicine which are preserved in the Archivio Antico of the University of Padua (University of Padua, Archivio Antico, cod. 305-306).

7. See p. 13.

8. The documents relating to the medieval studium of Padua have been edited in A. Gloria, Monumenti della Università di Padova (1222-1318) (Venice, 1884), and Monumenti della Università di Padova (1318-1405) (2 vols., Padua, 1888). Gloria drew upon manuscripts

F-I-3

preserved in the Biblioteca Universitaria of Padua (the manuscripts in the collection of the Biblioteca Universitaria relating to the history of the university have since been transferred to the custody of the Archivio Antico), the Biblioteca Civica, the Biblioteca del Seminario Vescovile, the Archivio Notarile, and the Archivio della Curia Vescovile, as well as upon a variety of earlier printed sources.

A helpful bibliography of manuscript material concerning the medieval history of the University of Padua is contained in Pearl Kibre, Scholarly Privileges in the Middle Ages (Cambridge, Massachusetts: The Medieval Academy of America, [1962]), pp. 341-351. The contents of the university's Archivio Antico are described in G. Giomo, "L'archivio antico della Università di Padova," Nuovo Archivio Veneto, VI (1893), 377-438. A. Favaro, "Preliminari ad una Bibliografia dello Studio di Padova," Atti e Memorie della R. Accademia di Scienze, Lettere ed Arti in Padova, New Series, XXXIII (1917), 35-49, and the same author's "Programma d'una bibliografia dello Studio di Padova," Atti e Memoria della R. Accademia di Scienze, Lettere ed Arti in Padova, New Series, XXXV (1919), 41-51, give an account of the history of the various archives in Padua and Venice containing material relating to the history of the university and the consequences of a period of serious neglect of manuscript materials in the late eighteenth and early nineteenth centuries. Two important manuscripts relating to the early history of the Paduan studium which are not found in local or Venetian archives, and which were unknown to Gloria are described in notes 10 and 11 following.

9. Statuta Dominorum Artistarum Academiae Patavinae (Padua, n.d., Hain no. 15015). I have consulted a microfilm of this work

F-I-4

supplied to Columbia University by courtesy of William H. Schneide. According to A. Favaro, "Saggio di Bibliografia dello Studio di Padova (1500-1920)," Miscellanea di Storia Veneta, Series 3, XVI and XVII (1922), p. 2, the attribution of this edition to the fifteenth century is an error and it really dates from about 1520. The volume contains statutes of the University of Arts compiled in 1465 and confirmed, with additions, in 1495. The list of medical texts appears at 2.16, fol. 24v; for discussion of its contents see below, p. 290.

Contemporary statutory evidence concerning the arts and medical curriculum in the thirteenth and fourteenth centuries is equally lacking as regards Bologna, the other leading Italian university center. There the earliest document describing the curriculum in arts and medicine, again a set of student statutes, dates from 1405 (C. Malagola, Statuti delle Università e dei Collegii dello Studio Bolognese [Bologna, 1888], 274-277). The absence of early documents describing the curriculum in arts and medicine at Bologna is of significance for Padua, since, in general, the practices of the mother university had considerable influence in the Paduan schools.

10. R. Denifle, "Die Statuten der Juristen-Universität Padua vom Jahre 1331," Archiv für Litteratur- und Kirchengeschichte des Mittelalters, VI (1891-1892), 309-562.

11. Florence, Biblioteca Medicea Laurenziana, Ashburnham cod. 206, 15th cent., fols. 72vb-73ra. A revision, dated 1407, of the statutes of the College of Doctors of Arts and Medicine of 1330. Inc. "Incip'unt statuta collegii artistarum et medicorum Paduanī. In Christi

F-I-6

nomine amen, 1330. . . ." Attention was first drawn to this manuscript by Professor Pearl Kibre; it is described on p. 346 of her Scholarly Privileges.

12. University of Padua, Archivio Antico, cod. 124, Reform Statutes of the College of Doctors of Law, 1249-1463, noted in Kibre, Scholarly Privileges, p. 341. Extracts relating to the years 1349-1394 are printed in Gloria, Monumenti, 1318-1405, II, 29-30.

13. University of Padua, Archivio Antico, cod. 305, Congregations and acts of the Collegio Artistarum, 1367-1378; cod. 306, Congregations and acts of the Collegio Aristarum, 1391-1398. Their contents are described in Gloria, Monumenti, 1318-1405, I, 70-71.

14. Early statutes are printed and described in A. Gloria, ed., Statuti del Comune di Padova del Secolo XII all'anno 1285 (Padua, 1873), pp. 372 and 375-379, refer to the studium; and Luigi Andrich, "Gli statuti del comune di Padova del secolo XII all'anno 1325," Re vista Italiana per le scienze giuridiche, XXIV (1897), 132-173, (pp. 171-173 relate to the studium); the so-called Codice Carrarese (Liber Statutorum Communis Padue, Biblioteca Civica, Padua, cod. 1237) of 1362 has not been printed in its entirety, but portions relating to the studium are incorporated in Gloria, Monumenti, 1318-1405. In 1261 the commune did stipulate what legal texts should be lectured on. See p. 18.

15. Among the most interesting are the inventory of the possessions of Giovanni Dondi, professor of arts and medicine, on June 22, 1389 (Gloria, Monumenti, 1318-1405, II, 224), and the will of Benedetto

F-I-6

Greco of Salerno, former rector of the University of Arts and Medicine, which is dated June 14, 1401, and incorporates a lengthy list of books (ibid., p. 384).

16. All known surviving wills of Paduan doctors of the thirteenth and fourteenth centuries are apparently included in Gloria's Monumenti. According to information given to the writer by Professor Paolo Sambin of the University of Padua, whose knowledge of the Paduan archives is unrivalled, no wills in this category other than those printed by Gloria are known to exist. Since the documents included in the Monumenti are not always printed in their entirety, a check was made of the originals of wills made by doctors before 1350 in order to ascertain if any names of books had been omitted from the printed version. The results of this investigation were negative.

17. J. K. Hyde, Padua in the Age of Dante (Manchester, England: Manchester University Press; New York: Barnes and Noble, 1966), p. 35.

18. Bruno was believed to have been a professor by F. M. Colle. (Storia scientifico-letteraria dello Studio di Padova [Padua, 1824], III, 123, and A. Gloria, Monumenti, 1222-1318, p. 348), but both these authors were desirous of finding evidence to prove the continuity of the studium in the mid-thirteenth century. For a discussion of Bruno's works see below, p. 331.

19. Although A. Gloria wrote no narrative history, as such, of the medieval studium of Padua, the introductory sections of his volumes of Monumenti contain a mass of information on this topic. The basic

F-I-7

narrative accounts are Rashdall, Universities, II, 9-21, and H. Denifle, Die Entstehung der Universitäten des Mittelalters bis 1400 (Berlin, 1885, reprinted 1956), 276-289. Useful for specific aspects of the development of the studium is the chapter on Padua in Kibre, Scholarly Privileges (pp. 55-84) and also pp. 116-123 in the same author's The Nations in the Medieval Universities (Cambridge, Massachusetts: Medieval Academy of America, 1948). There are a number of older histories of the studium by Paduan historians of which the best is probably Colle's Storia scientifico-letteraria. For the histories of Tomasini, Riccoboni, Papadopoli and Facciolati, see Bibliography.

20. Some idea of the small amount of documentary material available on the early years of the Paduan studium can perhaps be gathered from the fact that in the Monumenti compiled by Gloria only about one hundred pages of documents relates to the period between 1222 and 1318 and only about twenty-five to the period between 1318 and 1350, the terminal date of the present study. Moreover, much of this material--probably the larger part--consists of wills, contracts, and other notarial documents whose only relation with the studium is the presence of doctors or scholars as witnesses or contracting parties.

21. Rashdall, Universities, II, 10. Regarding the teaching of grammar at Padua before the thirteenth century, see below, p. 46.

22. "Hoc anno translatum fuit studium de Bononia Paduan" (Regimin® Padue in L. A. Muratori Rerum Italicarum Scriptores, VIII,

F-I-8

Part 1 [Città di Castello, 1906], 305; Rerum Italicarum Scriptores is hereafter cited as RIS).

22. Rashdall, Universities, II, 10, and Denifle, Die Entstehung, p. 278. Jordan described certain students as "competentis litteraturae." For an account of Jordan's career see M. Aron, Un animateur de la jeunesse au XIII siècle (Paris, 1930).

24. The work was the Boncompagnus of Boncompagno of Florence, the explicit of which states "Item datus est in comune deductus fuit Padue . . . in praesentia . . . professorum iuris canonici et civilis et omnium doctorum et scolarium Paduae commorantium" (Boncompagnus [extracts] in L. Rockinger, Briefsteller und Formelbucher des elften bis vierzehnten Jahrhunderts. Quellen und Erörterungen zur Bayerischen und Deutschen Geschichte, IX [1863], p. 174). The passage is quoted in Rashdall, Universities, II, 11, and Denifle, Die Entstehung, 278. For discussion of the episode in relation to rhetorical teaching at Padua, see below, p. 49.

25. The contract is printed in Gloria, Monumenti, 1222-1318, documents pp. 5-8, and discussed by Rashdall, Universities, II, 11-12, and Denifle, Die Entstehung, 279-281.

26. See, for example, Gloria, Monumenti, 1222-1318, pp. 129-139, and Rashdall, Universities, II, 12-13.

27. On the assumption that several students might be expected to occupy each house. An even higher figure is suggested by Rashdall, Universities, II, 12.

F-I-9

28. There is some doubt about the existence of the German association; the agreement with Vercelli was made by the other three groups, but the Germans appear to have been intended to constitute one of four associations of scholars to be established at Vercelli. Gloria took this to mean that there were German scholars at Padua in 1228 and that they wished to remain there and not to join in the migration to Vercelli, but this scarcely seems to be established by the evidence. See Gloria, Monumenti, 1222-1318, p. 127 and Rashdall, Universities, II, 14.

29. The contracting parties on behalf of the Paduan scholars included "Adam de Canochio rectorem Francigenarum, Anglicorum, Normanorum . . . Gaufridum Provincialem rectorem Provincialium et Spanorum et Catellanorum" (Gloria, Monumenti, 1222-1318, documents, pp. 5-6, cited from another printed edition in Kibre, Nations, p. 116).

30. "Et salaria debeant taxari ante festum Omnium Sanctorum et solvi ante festum S. Thome Apostoli, videlicet uno theologo, tribus dominis legum, duobus decretistis, duobus decretalistis, duobus phisicis, duobus dialecticis, duobus gramaticis. . . ." See Gloria, Monumenti, 1222-1318, documents, p. 7.

31. Denifle, Die Entstehung, pp. 280-281. Denifle believed that the distribution of chairs in the Vercelli contract was probably influenced by the charter recently granted by Frederick II to his newly founded studium at Naples. Permission to establish a chair of theology at Padua was given by Urban V in 1363; his bull is printed in Gloria, Monumenti, 1318-1405, II, 55. Theology appears to have been taught

F-I-10

privately in the various convents in Padua for some time before 1363.

32. "Optime institutus in artibus," quoted in Denifle, Die Entstehung, p. 281.

33. This episode and the dating of the life in question are discussed by Denifle (ibid., pp. 282-283).

34. Ibid., p. 284, and Rashdall, Universities, II, 14.

35. A brief account of these events is given in Hyde, Padua in the Age of Dante, pp. 1-2.

36. The migration appears to have been caused by internal troubles in Bologna, as was the migration of 1274 which was caused by that city's war with Forlì and a papal interdict laid on the Bolognese schools. See Rashdall, Universities, II, 14, and Kibre, Scholarly Privileges, p. 63. Thus, as was often the case in the thirteenth and fourteenth centuries, the troubles of the schools of Bologna were the good fortune of the schools of Padua.

37. See Kibre, Scholarly Privileges, pp. 56-62 for a full account of the various privileges enjoyed by scholars in Padua. The relevant statutes are printed in Gloria, Statuti del Comune di Padova, pp. 372, 375-379, and also appear, scattered among other entries, in Gloria, Monumenti, 1222-1318, documents, pp. 14-24.

38. Its provisions are incorporated in the statutes of the jurist universities compiled in 1331. See H. Denifle, "Die Statuten der Juristen-Universität Padua," pp. 513-523.

F-I-11

39. Gloria, Monumenti, 1272-1318, documents, p. 23 (communal statute of 1262). A communal statute of 1276 states that public salaries were paid to doctors of civil and canon law in Padua before 1236, but according to the editor this evidence is not to be relied on (Ibid., pp. 9-10).

40. The bull is printed in Gloria, Monumenti, 1272-1318, documents, p. 24.

41. Additional migrations of scholars from Bologna took place in 1306 and 1321-1322; see Kibre, Scholarly Privileges, p. 63; Rashdall, II, 15-16; and A. Favaro, "Nuovi documenti intorno all'emigrazione di professori e di scolari dallo Studio di Bologna avvenuta nel 1321." Atti e Memorie della R. Deputazione di Storia Patria per le Province di Romagna, ser. 3, X (1891-1892), 312-323. The pact made between the Comune and the migrating scholars in 1321-1322 is incorporated in the jurist statutes of 1331 and is printed in Denifle, "Die Statuten der Juristen-Universität Padua," pp. 522 ff.

42. An indication of this is, for example, to be found in the statement of Michele Savonarola, who wrote about 1445, that the works of Marsilio Santa Sofia, professor of medicine at Padua from the 1360s until the end of the century, and of Jacopo da Forlì, his colleague and approximate contemporary, were widely used as university texts: "Marsilii Sophistici et Forliviensis opera medicorum nostri temporis legentium gymnasia repleant" (M. Savonarola, Libellus de magnificis ornamentis regiae civitatibus Padua, Muratori, RIS, XXIV Part 15 [Città di Castello, 1902], 37).

F-1-12

43. The jurist statutes of 1331 open with an historical account of the compilation of earlier sets of statutes. It is stated that Gosaldus of Spain, who was rector of both universities in 1260 "primum, ut audivimus, tamquam diligens et discretus, statutis et regulacionibus fundavit studium Paduanam. . . . (Denifle, "Die Statuten der Juristen-Universität Padua," p. 380.)

44. The apparent membership of doctors in the universities is somewhat surprising, since the universities of Padua are generally believed to have been student corporations, as were the universities of Bologna on which the Paduan corporations were closely patterned (Rashdall, I, 148-150). Yet the presence of doctors as members of universities at Padua appears to be attested by at least two documents. One is the Bull of Urban IV issued in 1264, which uses the expression "universitatis magistrorum et scollarum Paduanorum." It is, however, conceivable that the Pope may have been referring to the aggregate of masters and scholars at Padua in general terms, without any specific connotation of an organized corporation. The other document, since it is of Paduan provenance, is perhaps more difficult to dismiss. It is an agreement reached between the jurist universities and the University of Arts and Medicine in 1399. In describing an earlier agreement of 1360 between the same corporations, it refers to the "universitatis doctorum et scolarum juris canonici et civilis" (Gloria, Monumenti, 1222-1318, documents, p. 24; and Monumenti, 1318-1405, I, 184 and II, 342). Here, too, however, the reference may be general rather than specific.

45. As was the case, e.g., in 1260 when Gosaldus of Spain was described as "rector universitatis utriusque" (Denifle, "Die Statuten

F-I-13 der Juristen-Universität Padua," p. 380).

46. Ibid., p. 399, and Kibre, Nations, p. 112. The ultramontane nations were those of Germany (with two votes), Bohemia, Poland, Hungary, Provence, Burgundy, England with Scotland, Catalonia with Spain, and the 'nation from across the sea (*natio ultramarinarum*)," apparently composed of students from Cyprus. The cismontane nations were those of Rome, Sicily, the March of Ancona, Lombardy, Milan, Tuscany, the March of Treviso, Venice, Dalmatia, and Aquila.

47. Kibre, Scholarly Privileges, p. 61.

48. Gloria, Monumenti, 1222-1318, p. 167.

49. Kibre, Scholarly Privileges, p. 61, citing Monumenti, 1222-1318, documents, p. 20 (Communal statute of 1261).

50. Rashdall, II, 17, citing Denifle, "Die Statuten der Juristen-Universität Padua," pp. 417-422. For the duties of these officials, termed trattores, see Kibre, Scholarly Privileges, p. 59.

51. Gloria, Monumenti, 1222-1318, p. 166.

52. Denifle, "Die Statuten der Juristen-Universität Padua," pp. 431-434.

53. Gloria, Monumenti, 1222-1318, p. 203, from cod. 1361 III in the Biblioteca Civica, Padua.

54. Ibid., p. 142. See also Hyde, Padua in the Age of Dante, p. 124.

F-I-14

55. This list is printed by Gloria, Monumenti, 1222-1318, pp. 146-153.

56. These names are Joannes Cacio, bishop of Padua (d. 1165) and decretorum doctor; Jacobus Baldoinus de Bononia, professor 1213-1235; Uguccio, bishop of Ferrara (d. 1210); Tancredus de Bononia, professor 1213-1234; Gerardus, bishop of Padua (1165-1213); and Simon Vicentinus, Professor 1227-1230. The last name is not printed by Gloria, but occurs in the version of the list printed in Hyde, Padua in the Age of Dante, pp. 315-317.

57. For the use of Uguccio's writings in teaching grammar at Padua, see below, p. 143.

58. Statute of the College of Doctors of Law, 1349, printed in Gloria, Monumenti 1318-1405, II, 29.

59. Rolandino, Chronica in factis et circa facta Marchie Trivixane, Muratori, RIS, VIII, Part 1 (Città di Castello, 1906), 173-174.

60. Rashdall, Universities, II, 18-19.

61. Kibre, Scholarly Privileges, p. 56, note 11.

62. Rashdall, Universities, II, 18.

63. The agreement of 1399 (Gloria, Monumenti, 1318-1405, II, 342-345) refers to the dispute of 1360 and sets forth the terms of the agreement reached in that year. The assumption that the University of Arts and Medicine did not elect a rector or professors before 1360 is

based on the fact that the right to do so was conceded in the pact of 1360. It is possible, however, that the agreement merely regularized an existing situation and that the scholars in arts and medicine may have begun, despite the protests of the jurists, to elect their own officers and professors before the mid-fourteenth century. The actual value of the right to elect professors was, in the mid-fourteenth century, perhaps rather doubtful, since by 1331 even the powerful jurist universities had been obliged to accept a good deal of interference from the civil government in this respect (see pp. 17-18). But no doubt the right was of significance as a symbol of the prestige of the university.

64. University of Padua, Archivio Antico, cod. 305, Acts of the College of Doctors of Arts, 1367-1378, fol. 7, cited in Gloria, Monumenti, 1318-1405, I, 101.

65. See above, p. 7.

66. Gloria, Monumenti, 1222-1318, documents, p. 14. See also Kibre, Scholarly Privileges, p. 58.

67. C. Zonta and G. Brotto, Acta graduum academicorum gymnasii Patavini (Padua, 1922), p. viii.

68. See below, p. 59.

69. Rolandino, Cronica, pp. 173-174.

70. Gloria, Monumenti, 1318-1405, II, 119.

71. Ibid., I, 449.

F-I-16

72. Gloria, Monumenti, 1222-1318, documents, p. 65.

73. Florence, Biblioteca Medicea Laurenziana, Ashburnham cod. 206, fol. 72vb.

74. Gloria, Monumenti, 1318-1405, I, 76.

75. Mention has already been made of an examination in medicine in 1307. A private examination in medicine in 1351 is also described as held in the presence of the provost of the artistarum et medicorum collegii (Gloria, Monumenti, 1318-1405, II, 30, examination of Bonus de Zamboninus); in 1392 the College of Doctors conceded the privilege of a rapid examination in liberalium artium scilicet grammatice dyalectice et philosophie to a student from Bologna (ibid., p. 264). It seems to have been exceptional to hold examinations in arts and in medicine for a single student on the same day, but this was conceded to Petrus de Roma in 1396 (ibid., p. 302).

76. As noted, doctors of law were present at the examination of Aymericus de Polonia in 1307; they also attended that of Bonus de Zambonius in 1351 (Gloria, Monumenti, 1222-1318, documents, p. 65; Monumenti 1318-1405, II, 30).

77. Gloria, Monumenti, 1222-1318, documents, pp. 63-64.

78. In 1339 a civic decree extended fiscal immunity to "magistri legentes et docentes in grammaticalibus non conventati" (Gloria, Monumenti, 1318-1405, II, 21).

79. Kibre, Scholarly Privileges, pp. 80-81. The situation at

Padua as regards the licensing of medical practice may be compared with that at Paris, where the faculty of medicine directly supervised medical practice in the city. See P. Kibre, "The faculty of medicine at Paris, charlatanism and unlicensed medical practices in the later Middle Ages," Bulletin of the History of Medicine, XXVII (1953), 1-20.

80. Gloria, Monumenti, 1222-1318, p. 124; Kibre, Scholarly Privileges, p. 58.

81. Gloria, Monumenti, 1318-1405, I, 63.

82. Ibid., pp. 62-65.

83. See above, pp. 9-10.

84. Kibre, Scholarly Privileges, pp. 62-63.

85. "quod in civitate Paduana . . . viguit et adhuc viget in jure canonico et civili aliisque facultatibus, praeter sacram theologiam, studium generale . . . et quod auctoritas faciendi per doctores et magistros in eodem studio residentes in jure ac facultatibus supradictis examinare scholares ad doctoratum seu magisterium promovendos in studio supradicto, et examinatos approbandi, seu etiam reprobandi similiter, et de antiqua consuetudine obtenta in eodem studio ad episcopum Paduanum, qui est pro tempore, pertinet . . . nonnullos scholares in jure civili et canonico ac medicina se examinari fecit per doctores ipsius studii, ipsisque postea licentiam dedit." Gloria, Monumenti, 1318-1405, II, 25-26.

86. Gloria, Monumenti, 1222-1318, documents, p. 20.

87. See above, p. 11.

88. Lynn Thorndike, History of Magic and Experimental Science (8 vols.: New York and London: Columbia University Press, 1923-1958), II, 921-922, discusses the question of Peter's salary in detail, and shows that it was five hundred pounds (presumably of Venetian deniers petty, which were, according to Hyde, Padua in the Age of Dante, p. 42, the normal currency in Padua at the time) per year. Peter of Abano was an exceptionally distinguished professor, and it does not necessarily follow that the Commune offered equally generous terms to any other professors of arts and medicine in the same period. Moreover, even in Peter's case, the Commune seems to have been more lavish in promise than performance; Professor Thorndike has demonstrated that when Peter made his will his salary was almost four years in arrears. According to Engelbert of Admont, William of Brescia was a salaried professor of logic and philosophy at Padua in the 1270s and 1280s: "Continuavi studium ibidem (sc. Paduam) in logica et philosophia . . . sub magister Wilhelmo de Brixia, tunc acto ad salarium legente ibidem" (Engelbert of Admont, letter to Master Ulrich, printed in B. Pez, Thesaurus Anecdotorum Novissimus [Augustae Vindelicorum, 1721-1729], I, Part 1, col. 420, quoted in G. Fowler, The Intellectual Interests of Engelbert of Admont (New York: Columbia University Press, 1947), pp. 21-22.

89. "Item promiserunt et firmaverunt, quod duobus magistris ordinariis in medicina et uno extraordinario, et uno in cyrologia, et uno in physica [in the Ms., according to the editor, this word is abbreviated "phya," and might therefore signify "philosophia"] et uno in

F-I-19

loycalibus, et uno in grammatica de competentibus salariis provideatur a comuni" (Pact of 1321 in Denifle, "Die Statuten der Juristen-Universität Padua," p. 524).

90. Gloria, Monumenti, 1222-1318, p. 30. The regulations at Padua were in this respect exactly the opposite of those at Bologna, as Rashdall pointed out, with the remark that "The exclusion of citizens from the universities was maintained[at Padua] as at Bologna; but there was here no counterbalancing monopoly for citizen professors. On the contrary, citizens were expressly excluded by the statutes from the salaried chairs," (Universities, II, 17).

91. "triffatores immo verius destructores eligere non erubent, et, quod deterius est, cum tales apud scolares precibus, minis vel precio efficere non possint, ut ab eisdem eligantur, dispersa pecunia per cives procurant et per consilium Paduanam, ut in sede vacante constituentur" (Denifle, "Die Statuten der Juristen-Universität Padua," pp. 420-421). It is also stated that the purpose of the prohibition of the election of Paduan citizens was to procure the best and most famous doctors, which was formerly the only object in filling the chair; now, however, "idiotas, nondum lacte philosophice doctrine" are intruded.

92. A detailed account of the events of this period is supplied in Hyde, Padua in the Age of Dante, Chapter IX "The Crisis of the Paduan Commune," pp. 252-282.

93. Kibre, Scholarly Privileges, 63-66, describes the privileges accorded to the schools by the Carrara, and the attempt to recruit

F-I-20

scholars from Bologna in 1321-1322; A. Favaro, "Contribuzioni alla Storia della Studio de Padova intorno alla metà del secolo XIV," Atti e Memorie della R. Accademia di Scienze, Lettere ed Arti in Padova, new series, XXXVI (1920), 31-40, gives an account of an attempt to recruit scholars from Bologna in 1338. Gloria, Monumenti, 1318-1405, I, 85, lists three instances of invitations from the reigning prince to distinguished professors to teach in Padua (1344, 1370, 1398). For the exchange program in medicine with the University of Paris organized by Ubertino of Carrara, see Kibre, Scholarly Privileges, p. 65 and below, pp. 236-237.

94. Gloria, Monumenti, 1222-1318, p. 201. However, his only evidence for the latter statement appears to be that Engelbert of Admont studied at Padua for five years; but Engelbert studied logic and philosophy, not medicine, under William of Brescia who is known not to have taught medicine at Padua. By the fifteenth century a four year medical course appears to have been the rule at both Padua and Bologna (see below, p. 290).

95. The agreement of 1399, separating the University of Arts and Medicine from the universities of Law refers to "quilibet conventu- andus in artibus et medicine conjunctim vel divisim" (Gloria, Monumenti, 1318-1405, II, 342); but see also note 75 above).

96. At Paris, the arts course lasted six years in 1215 (David Knowles, The Evolution of Medieval Thought [New York: Vintage Books, 1964], p. 173).

97. Gloria, Monumenti, 1222-1318, p. 174.

98. Statuta dominorum artistarum (statutes of 1405, revised 1499)

F-I-21

2, 5, fol. 21v.

99. Gloria, Monument1, 1222-1318, p. 172.

100. It was, for example, used by Rolandino in 1262 (see above, p. 12). On the use of this term see Gloria, Monument1, 1222-1318, pp. 200-201.

101. Doctoral degrees in surgery were apparently granted at Padua in the fourteenth century, and perhaps before. The payment of a public salary to a lecturer in surgery has already been noted (see above, p. 10 , and note); in addition, mention may be made of a statute issued by the College of Surgeons of Venice in 1321 which provided that no surgeon could practice "nisi primo examinatus vel doctoratus in studio generali" (Gloria, Monument1, 1222-1318, p. 203). Padua was, of course, then and subsequently, the studium generale chiefly frequented by the Venetians (see also below, p. 303).

102. Only a general arts degree seems to have been granted. Thus, although there are fairly frequent references to doctors of grammar in the Monument1, there does not seem to be any record, at any rate in the period before 1350, of the grant of a degree in grammar alone (Gloria, Monument1, 1318-1405, I, 107). Instead, one encounters, for example, a degree (1359) "in artibus videlicet in logica et philosophia" (ibid., 1318-1405, II, 45), where "logica et philosophia" presumably represent the candidate's specialization.

103. See above, note 6.

F-I-22

104. Gloria, Monumenti, 1222-1318, pp. 202-204. Upon passing the private, or preliminary examination to which only the candidate and the examining doctors were admitted, the scholar had to swear to take the public examination within six months, and pay a fine if he failed to do so.

105. Ibid., p. 205.

106. Denifle, "Die Statuten der Juristen-Universität Padua," p. 476.

CHAPTER II

GRAMMAR, RHETORIC AND LOGIC

Of the arts of the trivium, grammar and rhetoric were not only taught within the Paduan faculty of arts before 1350, but together appear to have formed its largest division. Of ten magistri regentes in arts named by the historian Rolandino of Padua as present at the formal reading of his Cronica Marchie Trivixane in 1262, no fewer than six, including Rolandino himself, were professors of grammar and rhetoric.¹ For the entire period between the immigration of Bolognese students in 1272 and 1370, A. Gloria found records of thirty-two professors of grammar and rhetoric but of only thirteen professors of medicine and surgery, and of no more than four professors of logic.²

The position of grammar and rhetoric at the beginning of the study of the liberal arts, and the content of grammatical and rhetorical teaching, formed part of a continuous educational tradition stretching from late classical antiquity throughout the Middle Ages. In grammar, the Ars grammatica of the fourth century writer Donatus and the grammar of Priscian (fl. a. 500) were standard medieval school texts, and classical poetry never ceased to be studied.³ Rhetoric in the Middle Ages continued to be associated with the law, as it had been in antiquity. For example, it has been estimated that eighty per cent of the dialogue on rhetoric composed by Alcuin early in the ninth century is directly drawn from the De inventione of Cicero, a work that is almost wholly concerned with

courtroom oratory. For Alcuin, it has been observed, rhetoric was fundamentally a juridical art.⁴

The tradition of grammatical and rhetorical teaching was perhaps particularly strong in Italy, where the early emergence of a class of lay professionals--lawyers, physicians, and teachers--created a continuing demand for secular education in Latin letters.⁵ The revival of legal studies and the growth of the legal profession at Bologna, Padua, and elsewhere in Italy continued the association of law and rhetoric in the schools. It also provided many more opportunities for the practical exercise of legal rhetoric. Indeed, the connection between the two subjects can be seen in the career of Irnerius (d. ca. 1150), the traditional founder of the Bolognese law school, for it is said that he taught rhetoric before turning to the law.⁶ Later, Geoffrey of Vinsauf, author of the highly esteemed rhetorical text Poetria Nova (probably written between 1200 and 1215)⁷ appears to have taught rhetoric at Bologna.⁸ The Poetria Nova is itself largely based on the pseudo Ciceronian Rhetorica ad Herennium.⁹

At Padua, a tradition of grammatical teaching can be traced back to long before any sign of the existence of a college of masters or a university of students of arts. According to A. Gloria, teachers of grammar were to be found in Padua and its surrounding territory in the twelfth century.¹⁰ Moreover, as Padua developed as a center of legal studies it also naturally flourished as a center for the study of rhetoric and the closely associated ars dictaminis, the art of letter writing. It is, of course, well known that the study of the ars dictaminis, which provided essential training for aspirants to lucrative

II-3

notarial positions in ecclesiastical and secular chanceries, originated and reached its highest development in the schools of northern Italy. An important factor as regards the teaching of grammar and rhetoric at Padua is the growth in the late thirteenth and early fourteenth century of a literary circle centering upon Lovato Lovati (1242-1309) and Albertino Mussato (1262-1329), both of whom had legal training.¹¹ This so-called "pre-humanist" group of poets and students of the classics may quite properly be regarded as a product of the traditional rhetorical training given in the faculty of arts to prospective students of law and ars notaria.¹²

The dominant figure among the professors of grammar and rhetoric in the thirteenth century is the historian Rolandino who taught the two subjects at Padua from perhaps before the Bolognese student immigration of 1222 until his death in 1276.¹³ Rolandino, author of the Cronica Marchie Trivixane, a history of the city's recent past under the tyrant Ezzelino da Romano, recorded his own membership in the College of Arts, along with that of nine other magistri regentes in 1262.¹⁴ Of the other grammarians and rhetoricians who taught at Padua before 1350, much less is known, although at least two of them, Pace dal Friuli¹⁵ and Morando,¹⁶ composed verses which are still extant. It is noteworthy that a good many professors taught both grammar and rhetoric simultaneously, a fact that suggests that at Padua as at other Italian centers of learning the two subjects tended to merge.¹⁷

Not much evidence appears to exist concerning the content of the teaching on grammar at Padua. No grammatical work written by any Paduan

master before 1350 seems to be extant and no documents mentioning the names of required texts have so far turned up. It is possible that the standard works of Donatus and Priscian may have been supplemented or replaced at some time before 1350 by the thirteenth century grammars of Alexander of Villa Dei and Eberhard of Bethune.¹⁸ The two last named works were almost certainly used in Padua at a later date since they are found in several fifteenth-century manuscripts in the Biblioteca Universitaria.¹⁹ They may well have been introduced much earlier. Almost certainly the immensely popular Liber Derivationum, or etymological dictionary, compiled by the Bolognese canonist Uguccio (d. 1210) would have been known at Padua.²⁰ Two copies of this work and one of the lexicon by the eleventh century Italian grammarian Papias, which was one of Uguccio's principal sources, were among the few books on the liberal arts possessed by the Franciscans of Padua before 1396.²¹ It also appears that a collection of extracts from Uguccio was compiled by Jacopo Dondi, who wrote on medicine and astronomy in the 1340s and 1350s.²²

Evidence concerning the teaching of rhetoric at Padua is somewhat more abundant than that regarding instruction in grammar, although the earliest rhetorical works known to have been written by a Paduan master have, unfortunately, been lost. The works in question are a treatise, Quadriga, and a florilegium of proverbs and sayings of the poets composed by master Arsegnino of Padua in 1216. A manuscript of Arsegnino's writings was at one time in the possession of Bernardo Scardone, the sixteenth-century historian of Padua, who characterized its style as fitted for a rude age, but praised its utility and the beauty of the manuscript itself.²³ Nothing else appears to be known of Arsegnino

or his writings.

In all probability, an important influence on Paduan rhetorical teaching from the 1220s was the work of Boncompagno of Florence (b. after 1165, d. after 1235), one of the most celebrated masters of rhetoric and the ars dictaminis at the studium of Bologna.²⁴ Boncompagno was the teacher of Rolandino upon whom he conferred "the office of master" at Bologna in 1221.²⁵ In view of Rolandino's expressed pride in his connection with Boncompagno and his affection for Bologna, there is a strong likelihood, amounting almost to certainty, that his teaching followed that of his master. Moreover, there is a possibility that Boncompagno himself may have taught at Padua for a brief period in 1226 or 1227. His presence there is suggested by the statement in the explicit of the Boncompagnus, one of Boncompagno's two principal works, to the effect that the book was "given" (datus) and authenticated at Padua in the presence of the bishop and other ecclesiastical dignitaries, the professors of canon and civil law, and all the doctors and scholars of Padua.²⁶ Thus, whether or not the word "datus" implies that Boncompagno was personally present at the ceremony in question, there seems to be little doubt that the Boncompagnus was required reading in the faculty of arts at Padua. It is probably safe also to assume that the same author's other works were similarly read and possibly utilized as texts there.

Boncompagno's principal works are the Boncompagnus, or Rhetorica Antiqua, which was completed in 1215, and the Rhetorica Novissima,²⁷ completed in 1235. In these works, he espoused what he believed to be a modern practical rhetoric and ars dictaminis based on the style of the papal chancery and some degree of preference for biblical in the place of

classical citations. His work was designed for law and notarial students; his expressed scorn for the rhetoric of Cicero and for the school of Orleans,³⁰ which emphasized mainly the study of classical authors, was grounded in the belief that concentration on the classics could not in itself provide an adequate rhetorical preparation for such students. However, as Dr. Wieruszowski has pointed out, it is possible to over-emphasize Boncompagno's disdain for the classics: his works in fact show a fair familiarity with a number of classical writers including Livy, Cicero, Sallust, Pliny and Josephus; he also knew Ovid, Virgil, Seneca, Lucan, Juvenal, Priscian and Cassiodorus, at least by name.³¹ Another recent scholar has demonstrated that it was scientia litteralis rather than legal training that Rolandino of Padua sought and obtained from Boncompagno at Bologna and that Rolandino's own work shows considerable knowledge of some classical authors.³² Boncompagno, who described rhetoric as being simultaneously "the empress of the liberal arts and the child of both canon and civil law,"³³ clearly recognized that lawyers and notaries were expected to be men of some degree of literary culture. Nonetheless, it is probably not unfair to say that he and his school gave little importance to classical studies for their own sake. The Boncompagnus, as the author styled the work officially approved at Padua, consists of a manual and collection of sample letters intended to serve as aids in the teaching of the ars dictaminis.³⁴ The letters are divided into six books. The first deals with the affairs of masters and scholars, providing guidance on such topics as ecclesiastical benefices given to scholars, the appointment of lecturers, and the importance of using correct names and titles. In addition it touches on the composition of

scholars' requests for money and of invectives against those who fail to
³⁵ study. The second book refers to ecclesiastical appointments and
 administration; the third to the affairs of the papal court; the fourth
 to the diplomatic and administrative concerns of secular rulers; and the
 fifth to administration of the affairs of bishops and clergy. The sixth
 book deals with miscellaneous municipal and private situations, mostly of
 a legal nature, including the choice of a podestà, commercial correspond-
³⁶ ence, the making of wills and matrimonial matters. It will be seen that
 the book is primarily designed to assist those charged with the responsi-
 bility for administrative or diplomatic correspondence in ecclesiastical
 and secular chanceries.

The Rhetorica Novissima, a title presumably intended ³⁷ to contrast
 with that of the ps. Ciceronian Rhetorica Nova, as the Rhetorica ad
Herennium was often termed in the Middle Ages, was apparently designed as
 a manual for lawyers, and includes what appears to be instructions
 regarding spoken oratory. The author states, "The instrument of rhetoric
 is oratory." ³⁸ Elsewhere in the work oratio is defined as "a discourse
 which is carried on in a lawsuit" ("Sermo qui continetur in causa"). In
 a group of sample adornments for speeches, giving arguments for and
 against each of the liberal arts and medicine, rhetoric is alluded to
 both pro and contra.

On the positive side, the orator invites everyone to the faculty
 of oratory (oratoriam facultatem), alleging that no one can speak rightly
 about anything or be defended by a glorious voice, or have fluency either
 in ordinary speech, or in a sweet sermon, or in a persuasive exordium,

or can persuade anyone with affable oration without the stamp (documento)
of the faculty of rhetoric.⁴⁰ The contrary argument affirms, however, that
the orator puts his tongue up for sale, weakens the right, strengthens the
false, damns the innocent, and liberates the condemned. It is perhaps worth
remarking that the arguments Boncompagno advances against the other liberal
arts in the companion pieces pro and contra all turn on the allegation that
the arts teach things that can be acquired informally by people of ordinary
intelligence. Thus, of arithmetic he says, "There is no one so ignorant
that he doesn't know how to count his money."⁴¹ Evidently, even for the
sake of formal symmetry, he could not bring himself to denigrate the
effectiveness of his own specialty.

The thirteen books of the Rhetorica Novissima treat of such topics
as the fourteen sources of the law, definitions, including the definition
of rhetoric and its parts, the conventions of oratory, including proper
conduct and dress before judges, aids to memory, oratorical adornments, and
invective and flattery.⁴² The style is discursive and occasionally
humorous. Citations appear to be chiefly of the Bible. Of interest for
the present study is Boncompagno's sample "exordium"⁴³ for masters who
establish their disciples as their successors in teaching," since it was
probably in some such terms that Rolandino of Padua was addressed when he
"unworthily received the office of master from Boncompagno my lord and
master." The sample exordium on this topic in the Rhetorica Novissima,
however, assumes that the master making the speech is retiring from teach-
ing in favor of the pupil, which, of course, was not the case when
Boncompagno conferred the office of master upon Rolandino. Beginning with

a reference to the wisdom of Solomon, the master points out the inevitability of the passage of each generation, and states that masters, like fathers have the duty of appointing heirs lest "the human condition and every kind of science should perish." The speech continues: "wherefore I appoint Master B. our brother and fellow-scholar (socium), who is sufficiently instructed in this faculty, as my heir and chief successor, requesting that you should serve under his rod."⁴⁴

While the works of Boncompagno were probably the most important texts of roughly contemporary origin in the teaching of rhetoric at Padua in the thirteenth century, the most outstanding, and hence in all likelihood the most influential, teacher was Boncompagno's pupil. The chronicler Rolandino (1200-76) combined the teaching of grammar and rhetoric with a career as a municipal notary.⁴⁵ Like Boncompagno, he must have spent much of his time on the rhetorical preparation of law and notarial students. Throughout his life as a teacher, the faculty of law continued to dominate the Paduan studium. The education of notarial students which was at Bologna, separated from the faculty of arts by the 1230s,⁴⁶ apparently continued to be the responsibility of the Paduan arts faculty until well into the fourteenth century.⁴⁷

Rolandino's own work, however, shows evidence of literary culture, and suggests that the rhetorical education he provided cannot possibly have been confined to narrowly professional and technical elements. His only surviving work is the well known Cronica Marchie Trivixane, several times referred to above. It is a history of the tyranny of the da Romano family, who ruled Padua, nominally on behalf of the Empire, from 1237 until 1256. This work which received the official approbation of the

II-10

College of Artists of Padua at its public reading in 1262, may itself, according to Dr. Arnaldi, have been used as a minor text in the teaching of rhetoric.⁴⁸ The approval of the work by the faculty of Arts may also have ensured its adoption as a quasi-official history of the city.⁴⁹

Although his inspiration was perhaps Boncompagno's youthful account of the siege of Ancona,⁵⁰ Rolandino produced a more extensive and ambitious historical work than that of his master, as a brief analysis may reveal.

In the preface of the Cronica Marchie Trivixane, the author defers to the superior merits of Virgil and Lucan, and explains that he is writing in prose rather than verse because prose is nowadays generally more intelligible than verse. He is also at pains to justify his use of Latin rather than the vernacular. The learned tongue would not, he believed, make his work less useful and enjoyable, especially to educated people (litteratis).⁵¹

The history itself is a well-organized, carefully composed account of the rise, tyranny, and fall of the da Romano. Digressions are few, and the style, while ornamented with diatribes against Ezzelino da Romano and occasional extended metaphors from classical history or mythology, is on the whole fairly straightforward. The work is notable for the inclusion of numerous diplomatic letters and speeches, which do not necessarily purport to be authentic, such as that from Bishop Gerardus of Padua to Ezzelino, of which Rolandino remarks: "This, or something similar, he said."⁵² Boncompagno had introduced some similar material into the Liber de Obsidione Anconae, but Rolandino used such interpolations more frequently. These speeches and letters could certainly serve as models of dictamen and oratory if required; Rolandino's own experience as a practicing

II-11

notary, who had been involved in some of the events he described, would provide an additional guarantee of their appropriateness to the given circumstances.

Literary works cited by Rolandino include the Pharsalia of Lucan (the same tag is quoted twice), the Epistolae and the Ars Poetica of Horace, the Heroides and De Amore of Ovid, the Psychomachia of Prudentius, and a latinized Aesop.⁵³ The reference to Aesop occurs in an anecdote about the tyrannical government of Ezzelino that incidentally depicts Paduan lawyers and notaries of the mid-thirteenth century as possessed of at least a limited literary culture. Rolandino relates that a crowd of burghesses and knights used to congregate daily in the hall of the podestà appointed by Ezzelino da Romano. On one occasion in 1249, a hawk was brought into the hall. When he saw the bird, a certain man of literary education (aliquis litteratus) was reminded of verses in Aesop concerning doves who accepted a hawk for their king and afterwards regretted it. Someone else, who liked the verses, asked to have them in writing. They were circulated, according to Rolandino, purely for their literary interest and without any political or polemical intent, a protestation that one may or may not take at its face value. When the lines reached the podestà, however, he found them a little too apt for his liking and promptly imprisoned "his own judge Bonaventura and with him a number of Paduan notaries and citizens who had listened to the verses and also certain judges," to the number of about twelve. Later, they and their families were executed on Ezzelino's orders.⁵⁴

The citation of authors by Rolandino is not, of course, evidence for the formal study of the writers named in the schools at Padua when

Rolandino was teaching there. The citations do, however, suggest both that the classics were never wholly neglected in the schools, and that such literary culture as members of the legal and notarial professions possessed was in all probability initially acquired through the teaching of the members of the faculty of arts. It was from this background that the so-called Paduan pre-humanists emerged, and no discussion of the teaching of grammar and rhetoric at Padua would be complete without reference to the literary circle centering about Lovato Lovati (d. 1309) and Albertino Mussato (d. 1329).⁵⁵

As is perhaps fairly well known, the leading members of this circle had no official connection with the faculty of arts. Nonetheless, while it is, of course, true that Lovato was by profession a judge and Mussato a notary and ambassador, both probably received part of their education in the faculty of arts at Padua, and Mussato, at any rate, maintained connections with the College of Arts in later life.⁵⁶

The two major works of Lovato Lovati, namely a Latin epic on the story of Tristan and Isolde and a poem deploring the factional strife of Guelfs and Ghibellines in Padua, are lost.⁵⁷ There survive, however, from his pen a number of metric epistles and carmina, which have been edited,⁵⁸ and a brief note on Senecan meter.⁵⁹ Although he wrote nothing else on the last named topic that has survived, Lovato was partly responsible for the interest in Senecan tragedy which became one of the principal preoccupations of Mussato. In Mussato's dialogue on Senecan meter, Lovato figures as the master, instructing Mussato, the pupil.⁶⁰ Nothing is known of Lovato's education in grammar and rhetoric, but presumably it took place in Padua. On the basis of age, he might well have been a pupil of

II-13

Rolandino. The son of a notary, Lovato studied civil law and served as a civic judge. Petrarch's judgment that Lovato would have been one of the leading poets of Italy if he had not mixed the nine muses with the twelve tables, is well known.⁶¹ The only direct connection between Lovato and the arts faculty that can be cited is his presence on a commission of "sapientes" which was apparently empowered to change certain regulations so as to enable or induce Peter of Abano to teach in Padua.⁶²

Lovato is chiefly notable for his wide classical culture and for his influence on Mussato, his principal disciple. Lovato's writings include references to or echoes of many of the favorite classical authors of the Middle Ages, including Cicero, Virgil, Horace, Ovid, Statius, Seneca, Persius and Aristotle.⁶³ In addition, as Billanovich has pointed out, he was also acquainted with works of Catullus, Tibullus, Propertius, Lucretius, the Silvae of Statius and the first, second and third decades of Livy, all of which were little known in the thirteenth century.⁶⁴ One of Lovato's surviving poems is, in fact, a defense of the writing of Latin verse in the classical style, which perhaps suggests that the atmosphere at Padua may not have been wholly favorable to the study of the ancient poets.⁶⁵

Whether Lovato's own works were ever formally studied at Padua cannot be ascertained. It is perhaps suggestive that an early fourteenth century manuscript of Lovato's debate with Mussato on whether or not it is desirable to have children is bound with Quintilian's De Institutione Oratoria, a widely used textbook of rhetoric. The manuscript in question is believed by Novati to be in the hand of one of the parties to the debate or that of its arbitrator.⁶⁶

II-14

Lovato's influence on Mussato and Mussato's connections with the faculty of arts are, however, indisputable. Mussato was born in fairly humble circumstances in 1261 or 1262.⁶⁷ As a youth he earned his living copying "Catones," that is the Distich of ps. Cato, a popular elementary text for students of grammar.⁶⁸ There is no evidence that Mussato received any part of his own education outside Padua and, as Hyde has pointed out, he referred to the grammarian Bonincontro da Mantova, who appears to have taught at Padua, as the master of his first youth.⁶⁹ Mussato became a notary and embarked on a career of active involvement in Paduan politics. This included serving as the city's ambassador to Henry VII and ultimately led to his exile in Chioggia, where he died in 1329.⁷⁰ Mussato's principal works are the Historia Augusta de Gestis Henrici VII Caesaris,⁷¹ a history of Henry VII's expedition to Italy and his own part therein, a sequel de Gestis Italicorum post Henricum VII Caesarem,⁷² the Ecerinide,⁷³ a verse tragedy on the Senecan model about Ezzelino da Romano, and various verse epistles.⁷⁴ The historical works are ambitious productions modelled on the style of Livy. The author, referred to in the third person, plays a prominent part in the action, and numerous speeches by Mussato and others are included in the text. Originally employed to represent Paduan interests in the face of the supposed threat of the re-establishment of imperial power in northern Italy, Mussato appears to have developed some admiration for Henry VII, possibly as a result of propinquity to him. His imperialism does not, however, appear to have been as deeply rooted or as principled as that of Dante.

The famous coronation of Mussato by the College of Arts of Padua for his work as a tragic poet and as a historian took place in 1314 or 1315.⁷⁵

Mussato commemorated the occasion, or possibly its first anniversary, by dedicating a metric epistle to the College of Arts.⁷⁶ In these verses the poet asks how he can appropriately respond to so signal an honor, since he is not Ovid, Livy, Virgil, Catullus, Statius, or Lucan. He then alludes to his own works, that is the Historia Augusta and the Ecerinide. There follows an account of the apparently annual commemoration of his coronation by a gift of kidskin gloves brought to his house by the praepositus with a crowd of students in attendance. The poem continues with a lengthy defence of tragedy as a poetic form; the titles of Seneca's tragedies are listed. Mussato ended the epistle with the modest declaration that although his work is not like that of Sophocles, and his is a purely Latin culture, at least he is not troubled with the envy of others--such grace, at any rate, God gives to the poor.⁷⁷

Several points about the epistle just summarized appear to be of interest. In the first place, the classical poets named at the beginning of the poem may be presumed to be those normally familiar to the members of the College of Artists and probably those studied by them: the sense is that these were the poets the College might have been expected to honor. Dr. Wieruszowski has postulated the study of a "canon" of poets at Bologna and by Rolandino at Padua in the thirteenth century.⁷⁸ This canon is said to have consisted of Virgil, Ovid, and Horace, together with either Lucan or Statius. Mussato alluded to every poet in the canon except Horace and added the names of Catullus and Livy. Perhaps the fame of Lovato, who, as noted above, was familiar with Catullus, had led to the introduction of the latter poet's works into the schools of the Paduan studium. Mussato's own historical writings are very clearly

II-16

modelled on Livy, who is referred to in the prologue of the Historia Augusta as archigrahus.

Mussato's account of the ceremony by which his coronation was commemorated annually, stressed the official, public, and continuing commitment of the faculty of arts to the approbation of his works. Yet Mussato himself seems to have had some doubt about the extent to which the College of Artists appreciated what he was trying to do. His defense of tragedy is introduced by the lines:

Cerne prius, parvis si me conferre Poëtis
Jure potes, grates tum tibi Lector agam.
Exedit hoc igitur, ut me experire legendo
Ne pluri merces, quam pretieris, emas.⁷⁹

One possible reading of these verses appears to be that if the College has the right to confer poetic honors upon Mussato, then Mussato may return thanks in the guise of a lecturer. The College ought, however, to try out Mussato as a lecturer in case it gets more than it bargained for. The defense of Senecan tragedy that follows is presumably Mussato's "lecture," that is, his exposition of matter in which he believed the College of Artists should be instructed. The lines can perhaps therefore conceivably be construed as a plea for the study of Seneca in the faculty of arts.

The above interpretation depends on the supposition that the word lector is to be taken as a nominative, and that both lector and legendo are used in the sense of "lecturing" in the schools. Such terminology would seem quite appropriate in a poem addressed to the members of a College of Arts. Equally valid, however, is the interpretation given by Manlio Dazzi, who reads lector as an accusative and both lector and legendo as parts of the ordinary verb "to read."⁸⁰

II-17

If the latter interpretation is correct the lines should be construed as meaning simply that the members of the College should read Mussato's works carefully before conferring any honors on him.

Further evidence of Mussato's connection with members of the faculty of arts and medicine lies in the fact that his Evidentis Tragediarum Senecae, an explanation of Senecan meter cast in the form of a dialogue between Mussato and Lovato Lovati, was written at the request of Marsiglio of Padua.⁸¹ Marsiglio, later to become famous as the author of Defensor Pacis, had achieved distinction in early life as a scholar in natural philosophy and as a physician at the studium of Padua.⁸²

Mussato had several friends among the grammarians and rhetoricians of Padua. He addressed verse epistles to Master Bonincontro of Mantua, professor of grammar, and Giovanni, professor of grammar.⁸³ The latter, however, is perhaps to be identified with the Giovanni, professor of grammar, referred to in the title of another poem as teaching the Venetians.⁸⁴ Mussato also addressed a poem to Guizzardo, professor of grammar, requesting the return of a copy of Virgil loaned by Mussato.⁸⁵ The poem appears to imply that Guizzardo taught at Padua. He is presumably the same as the Guizzardus who wrote a commentary on Mussato's Ecerinide.⁸⁶

That the intellectual atmosphere at Padua was not wholly favorable to the study of the classics or the contemporary poetry written in the classical manner may, perhaps, be indicated by the

fact that Mussato found it necessary to defend poetry in verses addressed to the Dominican Giovanni da Mantova and the jurist Giovanni da Vigonza.⁸⁷ In the poem addressed to Giovanni da Vigonza, Mussato defended poetry on the grounds that it is to be found in the Bible and the liturgy and was invented before philosophy; he also cited Aristotle and Plato as endorsing the use of poetic meter. Mussato joined Giovanni in deploring immoral verse; true poetry, he claimed, tells of the noble deeds of old. The poem to Giovanni da Mantova first deals with Giovanni's complaint that classical poetry contains references to heathen gods and then goes on to point out that there are Christian poets, such as Claudian, who wrote in the classical style.

A somewhat condescending attitude toward rhetoric and poetry was displayed by Mussato's contemporary Peter of Abano in commenting on a supposedly Aristotelian problem that inquired why people prefer examples to syllogisms. Peter explained that this question referred to rhetoricians and orators, who never speak without giving examples. However, he added, there are some truths of philosophy which people might not believe without the imaginative testimony of the poet.⁸⁸ For Peter, it would seem, poetry was only defensible insofar as it served as the handmaid of science.

Peter of Abano allowed rhetoric a place in medical education, since he believed it important that a physician should be persuasive and inspire confidence in his patients.⁸⁹ Grammar, he apparently considered as conferring merely elementary skill in writing Latin and reading and comprehending Latin texts or lectures.⁹⁰

Despite the moral objections of Giovanni da Vigonza and the

purely pragmatic approach to rhetoric and poetry of Peter of Abano, the poets can never have been in serious danger in the schools of Padua. Moreover, Mussato was not the only poet to have links with the faculty of arts. Pace dal Friuli, a minor poet who wrote verses on the Feast of the Purification and in praise of the Venetian republic,⁹¹ taught logic at Padua from before 1294 until after 1319.⁹² He was a member of the College of Arts, and assisted in conferring a doctorate in 1307.⁹³

The possibility also that Giovanni del Virgilio may have taught in the studium of Padua for a short period perhaps provides a further clue to a continuing interest in poetic study among the members of the faculty of arts in the 1320s. As is well known, Giovanni, surnamed del Virgilio from his devotion to the poet Virgil, was the author of eclogues addressed to Dante and to Mussato,⁹⁴ and was appointed by the city of Bologna to lecture on the major poets, namely Virgil, Ovid, Statius, and Lucan in 1321.⁹⁵ His duties at Bologna also appear to have included giving instructions in "poesim, rhetoricam et versificaturam."⁹⁶ The proemium of one of the extant manuscripts of the poems exchanged by Dante and Giovanni del Virgilio states that Giovanni, who was of Paduan family, taught at Padua as well as at Bologna and Faenza.⁹⁷ The manuscript in question has been described in detail by Billanovich, who believes that it embodies the teaching of Pietro da Muglio, a friend of Petrarch who taught at Padua in the years 1362-1368, and who was probably Giovanni's pupil.⁹⁸

If Giovanni del Virgilio did teach at Padua, it can only have been briefly. The proemium of the manuscript just referred to states that Giovanni went to Padua after he had been exiled from Bologna for

II-20

political reasons, that is, presumably after he had already resided and taught at Bologna. He is known to have been at Bologna from 1321 until 1323. In 1324-1325 (in at least November, February and March, according to Professor Kristeller) he was at the court of Rinaldo dei Cenci or Cinzi, tyrant of Cesena and former podestà of Padua.⁹⁹ It was in this period that he composed¹⁰⁰ the poem addressed to Mussato, the language of which clearly implies that at the time of writing the author had never personally encountered Mussato.

the long conceived ardour doubles in me - which
one day I will fulfil if envious fortune forbid not. -
to feed upon his (sc. Alpheisiboeus, as Mussato is
called in the poem) placid aspect and his placid speech.¹⁰¹

This poem has been interpreted as being inspired by Rinaldo dei Cenci's desire to attract Mussato to Cesena.¹⁰² It seems equally possible, however, that it reflects Giovanni del Virgilio's wish to secure an invitation to Padua. In September, 1325, however, Mussato went into exile, and Giovanni, whose admiration for Mussato had already been emphatically stated in his poems exchanged with Dante, would presumably not have been able to obtain employment at Padua immediately thereafter. Giovanni del Virgilio reappears in Bolognese records in 1326, and no information about him is available after 1327.¹⁰³ If he was at Padua at all, therefore, it could apparently have been only for a few months in 1325. It is equally possible, however, that he wished to continue his teaching career, interrupted at Bologna, at the Paduan studium, but was prevented by Mussato's exile or other circumstances.

Most of Giovanni del Virgilio's known works have been published in part at least and have been discussed by recent scholars, and they will not, therefore, be considered in any detail here. These

II-21

works, besides the poems already mentioned, consist of a poem known as the Diaffonus,¹⁰⁴ of two commentaries on Ovid,¹⁰⁵ evidently intended for the use of students, and of an ars dictaminis.¹⁰⁶ From his works, it appears that Giovanni del Virgilio united an entirely conventional type of poetical and rhetorical teaching with his interest in contemporary poetry. The commentaries on Ovid¹⁰⁷ are said to exhibit the influence of John of Garland,¹⁰⁸ one of the leading exponents of the so-called school of Orleans; the ars dictaminis is a practical, formal work describing the uses of the cursus and of punctuation, and pointing out faults in style. References are made to the Rhetorica ad Herennium and to Donatus.

Evidence that at Padua some knowledge of a wide range of classical writers was even in the first decade of the fourteenth century not the exclusive property of a small circle of poets and humanists is to be found in the existence of the Compendium Moraliū Notabilium, a florilegium of sayings of the poets, philosophers and fathers compiled by Geremia da Montagnone.¹⁰⁹ The compiler was a member of the Paduan college of jurist doctors and a civic judge. He never had, so far as is known, any personal connection with the arts faculty but presumably studied arts in Padua in his youth. Yet two of his three known works relate to topics within the field of medicine and the arts, namely the florilegium just mentioned and a medical dictionary. The dictionary has been lost and Geremia's third work, a collection of maxims he had found useful in legal practice, apparently survives in only one manuscript.¹¹⁰ All three of Geremia's compilations fall into the category of practical works of reference, which could be

II-22

consulted either by hard-pressed students or busy professional men. Of the Compendium moralium notabilium, Geremia himself said in the preface that "It should be thought very useful and almost essential for the purpose of having the knowledge and memory of notable moralia more readily to hand."¹¹¹

The work evidently filled a need, for it is said to survive in more than forty manuscripts.¹¹² It can perhaps be assumed therefore, that some knowledge, however slight and superficial, of the poets quoted in Geremia's florilegium was part of the ordinary educational equipment of lawyers and medical men trained in the studium of Padua at the beginning of the fourteenth century. As Dr. Weiss has pointed out, the range of classical authors and works cited in the Compendium moralium is unusually wide and distinguished by fairly accurate chronological order. Besides the inevitable Virgil, Ovid, Lucan and Statius, Geremia included such writers as Terence, Catullus (whom he knew not from another florilegium, but from a complete text), Horace, Persius, Juvenal, Martial, Sallust, and Seneca, as well as the ps. Cato of the Distich, Cicero, Prudentius, and Boethius.¹¹³

To sum up, grammar and rhetoric at Padua were in the thirteenth century, under the influence of Boncompagno and Rolandino, largely concerned with the professional preparation of lawyers and notaries. Even during this period, however, some Latin poets appear always to have been studied, notably Virgil and Ovid. An increasing interest in literary studies can be detected among members of the studium from early in the fourteenth century, but there was also opposition to this trend. Probably the presence in Padua of the humanist circle stimulated literary

II-23

interests in the studium; at the same time it should be reiterated that the Paduan poets and humanists are likely to have received their early training in grammar and rhetoric from the professors of the College of Arts. The fact that Lovato and Mussato later followed judicial and notarial careers by no means excludes this probability. It is clear, as already noted, that future lawyers and notaries pursued rhetorical studies at Padua, and that such studies were considered a necessary part of their professional preparation. Moreover, at least three professors of the College of Arts combined their teaching with a career as notary.¹¹⁴ Quite a close parallel can, after all, be drawn between the careers of Rolandino and Mussato. Both were notaries, both served the city in an official capacity, both wrote histories concerning the city's recent past. To this Rolandino added membership in the College of Arts, and Mussato political activities and the composition of poetry, but essentially they shared a common cultural background.

The cause of classical studies was probably helped not only by the presence in Padua of notable contemporary poets and humanists, but also by the development of an important medical school in Padua during the first half of the fourteenth century. The enrollment of growing numbers of medical students would make a rhetorical training designed solely for the professional needs of lawyers and notaries increasingly inappropriate. The separation of the ars notaria from the subjects of the trivium may therefore conceivably have been an indirect result of the growth of medical studies at Padua. A grammatical and rhetorical training that leaned toward literary study could provide a broad

foundation of culture for lawyers and physicians alike. Thus, by the second half of the century Petrarch was able to complain that Medici were expected to be lettered men who had read everything, including Cicero, Seneca and Virgil, while, in his somewhat jaundiced view, neglecting medicine.¹¹⁵

One further point that may perhaps be made in connection with grammar and rhetoric at Padua concerns the interest of the College of Arts in history writing. Whether or not historical works were formally studied in the studium is not known; if they were, it would presumably have been as texts in rhetoric, since history was not an academic discipline. There is no doubt at all, however, that the College of Arts gave official encouragement to writers of contemporary history. Not only was Rolandino's history publicly approved and authenticated by the College, but Mussato's coronation was a tribute to his historical as well as his poetic works. Indeed, his commemorative verses dedicated to the College of Arts, after naming both the Historia Augusta and the Ecerinide, continue with a defense of Senecan tragedy, a fact which may, as already noted, suggest that the poet felt more confident of the College's approval and understanding of his histories than of his poetry.¹¹⁶

No doubt civic patriotism was in large part responsible for these public demonstrations of approval. Nevertheless, the College of Arts lent its prestige to unified works of serious contemporary history, based on personal experience, but styled, in the case of Mussato, on classical models, at a time when most of the history written and read was either chronicle or romance. This is the more remarkable when

II-25

it is remembered that some intellectuals of the period apparently despised history as mere popular entertainment. Rolandino himself was careful to distinguish in the preface of the Cronica Marchie Trivixane between his work, written in Latin for an educated audience, and popular histories in the vernacular.¹¹⁷ Lovati wrote somewhat scornfully of having heard at Treviso,

from the high seat of the theater a cantor praying
about the army of Charles and Gallic deeds.¹¹⁸

His objection was apparently to the theme or its popularization, not to history as such, since he is known to have copied at least one Latin historical work in his own hand.¹¹⁹ The most notable member of the College of Arts in the period leading up to Mussato's coronation, namely Peter of Abano, viewed history-writing with disdain, characterizing it as the mere amassing of useless facts and no true science.¹²⁰ He also alluded condescendingly to the tales of Troy and Rome that fascinate the vulgar.¹²¹

In the face of such strictures, the approval of the College of Arts must have helped to secure for history writing at Padua the status of a respectable intellectual interest. It was certainly considered such by the learned bishop Ildebrando Conti (d. 1352), patron of the studium and of Petrarch and member of the College of Jurists. In his will, dated 1339, he stated:

I wish that all the books of Roman history and any other kind of history, except for the sacred scriptures, and all the books of Seneca which are, or shall be, in my house to be given and restored to lord Paolo di Conti, my nephew.¹²²

Mention may also be made of a fourteenth century manuscript of a history of Alexander the Great that passed to the Polish nation of Padua at an

undetermined date, having been previously the property of eius gymnasii
bibliothecae.¹²³

If the number of professors and the production of works be taken as the criterion, logic as such would appear to have played only a minor role in the teaching of the faculty of arts at Padua before 1350. The names of only five professors or doctors of logic associated with the studium are known,¹²⁴ and none of these appears to have left surviving works relating to the topic.

The first professor of logic whose name is recorded is the Magister Tredecino, "skilled investigator and doctor in logic," whose name occurs among the magistri regentes who approved the chronicle of Rolandino in 1262.¹²⁵ William of Brescia taught logic and philosophy at Padua from 1276 to 1281, possibly with a public salary and had a distinguished pupil in Engelbert of Admont.¹²⁶ William (d. 1326) was, as Engelbert said, a man of great reputation, but he achieved his fame as a teacher of medicine, medical author and papal physician long after leaving Padua.¹²⁷ His logical and philosophical teaching was merely the temporary occupation of a youthful scholar.¹²⁸ William's works, which are all on medical topics, cannot be used to yield any clue to the content of his logical and philosophical teachings at Padua, since they were evidently composed after he had left there to pursue medical studies at Bologna. A certain Matteo da Roncagette is said in his epitaph, dated 1303, to have interpreted the logic of Aristotle and the works of Galen surpassingly well, and, it appears, may have written Aristotelian commentaries which have not survived.¹²⁹ Two more doctors of logic are named in the document

II-27

recording the doctoral ceremony of Aymericus de Polonia in 1307, namely¹³⁰
 Odoardo, of whom nothing else is known, and the poet Pace dal Friuli.

The interests of Pace dal Friuli would appear to align him chiefly with the professors of grammar and rhetoric and the literary circle outside the studium. No other professors of logic in the schools can be named for the period under discussion. Nevertheless, while logical studies for their own sake may not have been much pursued, logic was undoubtedly taught and studied as an essential methodological tool. Its acquisition was regarded as a necessary preparation for study in the higher faculties of the studium, particularly that of medicine. Even without direct evidence one might suppose that this would be the case, since the formal study of logic was a mandatory preliminary requirement for those who intended to study medicine at the famous medical school of Salerno in the thirteenth century. This requirement was one of the principal provisions of a law laid down by Frederick II in 1231 which regulated the study of medicine in the Kingdom of Sicily with great thoroughness. The law stated that 1) no one might practice medicine in the Regno without securing both a certificate of competence, to be granted, after a public examination, from the professors of Salerno and a royal license; 2) no one might lecture on medicine at any place in the Regno except Salerno; and 3) that all prospective students of medicine must first study logic for at least three years (presumably at the studium of Naples founded by Frederick), "because the science of medicine can never be understood unless some requirements¹³¹ in logic are made mandatory."

As it happens, however, Peter of Abano, who, as noted, taught at Padua from about 1306 until about 1315, has left a particularly clear

II-28

and striking statement of the need for logic in the intellectual training of future physicians. Peter thought the matter sufficiently important to merit extended discussion in the opening pages of his principal work. Differentia 1 of the Conciliator¹³² is devoted to the well-worn theme that each of the seven liberal arts is necessary to the physician,¹³³ but whereas grammar, rhetoric and music are dismissed in a few words, and arithmetic and geometry in not much more, logic and astrology are elaborated upon for about a column each. Differentia 2¹³⁴ is wholly devoted to disproving the proposition that "the work that is appropriate to the medicus does not seem to be logical."

In Differentia 1 Peter states, citing appropriate authorities, that logical training is necessary to understand the more advanced medical texts; and that logical fallacies can spoil work in any of the arts. He added that it is impossible to understand medicine without dialectic unless one is a superlative genius (homo excellentius naturae) such as Hippocrates. Indeed, no one could read this book (presumably the Conciliator itself) to the end or understand most of it unless he had had at least some logical training. Logic is an organic part of all philosophy and defends us from evils in practice and fallacies in speculation. It is, "as it were, the salt that seasons the other sciences."¹³⁵

Differentia 2 first cites the arguments for supposing that the work of the physician does not depend on logic, and then refutes them. Some authorities have stated that logic plays no part in healing or prognosis, and that logic is therefore extraneous to the physicians' work, which concerns natural things. But Galen teaches that the physician should investigate the nature and cause of diseases by reason, and this is logic.

The skills of those who practice on the basis of experience alone are limited. Logic is of two kinds; the first kind is an instrument used in other sciences, a general method of inquiry (modus sciendi communis); the second type of logic is a speculative science in its own right. The first is the kind of logic necessary for medici. Logic directs and helps the other sciences as a method (in modo processus); according to Averroes, logic is the instrument leading the intellect to whatever is to be understood. The appropriate use of logic, however, varies with different sciences.

Although much of the Conciliator may have been completed before Peter returned from Paris to teach at Padua about 1306,¹³⁶ it can hardly be doubted that the author's teaching and influence at Padua would conform to the opinions he had expressed so strongly in writing. It is unlikely that Peter, who described himself in his will as "professor of medicine, philosophy and astronomy,"¹³⁷ himself taught at Padua the type of elementary logical methodology referred to in the passages summarized above. By the time Peter taught at Padua he was nearing the end of a distinguished career, and the task of giving instruction in the first principles of logic tended, as already noted, to be deputed to fairly junior professors. Peter was famous as an Aristotelian philosopher as well as a physician,¹³⁸ but his interests appear to have been primarily in the so-called libri naturales and the metaphysical works of the Philosopher;¹³⁹ citations from the Physica, Metaphysica, De anima, De celo et mundo and the Historia animalium abound in both the Conciliator and the Expositio Problematum Aristotelis, while references to the logical

II-30

works of Aristotle are relatively rare. Nevertheless, the opinion in favor of logic of the most prestigious doctor to teach in the faculty of arts in the given period must have reinforced the position of that subject in the curriculum.

Peter of Abano did not, however, originate the connection of Aristotelian studies with medicine at Padua, a pattern that was to become of considerable significance in the course of the fourteenth century. As already noted, Matteo da Roncagette combined instruction in Aristotelian logic and medicine before 1303, when Peter of Abano was still at Paris. Moreover, the fact that William of Brescia after teaching logic at Padua, proceeded to a distinguished medical career elsewhere, suggests that the connection between logic and medicine may already have been established in the 1270s. Even before then Rolandino, writing between 1259 and 1262, had cited a medical syllogism from the Posterior Analytics; speaking of Ezzelino pacing up and down after a meal, "according to that word of Aristotle in the Posterior Analytics which says 'Everything that prevents the food from rising in the stomach is wholesome, but a walk after meals prevents the food from rising, therefore a walk after meals is wholesome'".¹⁴⁰

Another source of Aristotelian teaching was probably Bologna. Bolognese Aristotelianism may have reached Padua with the medical works and teaching of Dino del Garbo (at Padua 1311-1312), but this, like the Aristotelianism of Peter of Abano, was primarily concerned with physica¹⁴¹ et sciencia naturalis rather than with logic per se, and will not be discussed at this point.

The texts used in logical instruction probably included the entire

corpus of the logical works of Aristotle, both "old" and "new", although the only evidence that can be adduced to support this conclusion is indirect. For instance, the monks of Santa Giustina in Padua owned a thirteenth century manuscript of the Topics in the translation of Boethius,¹⁴³ while an early fourteenth century manuscript of Robert Kilwardby's commentaries on the whole of the old and the new logic was purchased in Padua by the noted physician and bibliophile Giovanni di Marchanova and by him presented to an Augustinian congregation in Venice in 1467.¹⁴⁴ The florilegium of Geremia da Montagnone, which, as already noted, probably dates from between 1300 and 1310 contains citations from the Elenchi sophistici, the Analytica Priora and the Analytica Posteriora.¹⁴⁵

Almost certainly known in Padua were the commentaries on the logical works of Aristotle of Aegidius Romanus, or Giles of Rome (d. 1316), one of the most distinguished pupils of Thomas Aquinas.¹⁴⁶ These commentaries were probably the fruit of Aegidius' public teaching in the faculty of arts at Paris in the 1270s. Aegidius was a member of the order of Augustinian Hermits, and their chief intellectual luminary. In 1287, a chapter general of the Augustinians held at Florence commanded all "the professors and students" in the order to receive, and where necessary to defend, all the works of Aegidius.¹⁴⁸

In Padua, the Augustinian convent was one of the principal religious houses in the city and functioned as an intellectual center in its own right. In 1281 Aegidius himself disputed a series of theological quodlibeta¹⁴⁹ at a provincial chapter of the Augustinians held in Padua. It can hardly be doubted therefore that the logical works of Aristotle accompanied by the commentaries of Aegidius Romanus were studied by the

Augustinians of Padua before the end of the thirteenth century.

It is also probable that the formal "terminist" logic (the so-called logica moderna) developed in the thirteenth and fourteenth centuries at Oxford and Paris by Petrus Hispanus (d. 1277 as Pope John XXI) and such writers as William of Ockham (d. 1349) and Walter Burley (d. 1345?) did not remain unknown at Padua.¹⁵⁰

By the time of Rizzardo or Riccardo Malombra, who was professor of civil and canon law at Padua from before 1295 until about 1311,¹⁵¹ the use of dialectical methods and syllogistic reasoning had spread even to the law schools. Rizzardo's pupil, Alberico de Rosate informs us that his reverend master used to laugh at some of his fellow doctors who taught law with syllogisms, sophisms and dialectic. This method of arguing, Rizzardo believed them to have obtained from the doctors of France, some of whom were more distinguished for subtlety than usefulness. For students of law the ancient Italian doctors, Azo, Bulgarus and others, were in Rizzardo's view, quite subtle enough.¹⁵² Rizzardo's strictures evidently did not succeed in turning the tide, for one of the most distinguished Paduan professors of canon law in the next generation, Giovanni d'Andrea (d. 1348, teaching at Padua from about 1306)¹⁵³ was noted for the use of "philosophy" in his legal works.¹⁵⁴ Alberico da Rosate darkly ascribed the prevalence of logical subtleties in the law schools to student pressure and by implication, the weakness of popularity-hunting professors, saying "Modern students prefer to hear subtleties and syllogistic reasoning rather than useful information, and doctors applaud what they ought not to in these very matters."¹⁵⁵

II-33

However widespread may have been the use and study of logic as a methodological tool, both the remarks of Peter of Abano already alluded to and the absence of logical works by Paduan professors suggest that logic as a speculative science in its own right was not highly developed in the given period. In the first half of the fourteenth century the logica moderna was elaborated and refined in the works of such writers as Bradwardine, Heytesbury, Swineshead, and Dumbleton (the so-called Merton School) at Oxford, and Jean Buridan at Paris.¹⁵⁶ The writings of the doctors named are characterized by preoccupation with the analysis of mathematical and physical problems, and the boundary between mathematics, physics, and logic is in their work not always easy to determine. While there is reason to believe that the work of the Oxford doctors aroused considerable interest at Padua in the second half of the fourteenth century and thereafter,¹⁵⁷ there appears to be no evidence that any of their treatises were known in the Paduan studium before 1350. The earliest reference to an author of the Oxford school that can be cited from Padua is the exposition there by a certain Franciscus de Ferraria of a question "On the proportions of motions," in 1352.¹⁵⁸

FOOTNOTES TO CHAPTER II

1. "Magister Rolandinus, magister Morandus, magister Zunta, magister Dominicus, magister Paduanus, magister Luchsius in grammatica et retorica vigiles et utiles professores" (Rolandino, Cronica 12.9, pp. 171-147).

2. The professors of grammar and rhetoric listed by Gloria (A. Gloria, Monumenti 1222-1318, pp. 270-282; Monumenti 1318-1405, I, 523-525) are as follows: Arsegnino Padovano (1216); Rolandino (1221-1276); Leonardo (1222); Morando (1262); Zunta (1262); Domenico Padovano (1262); Padovano de' Piomboli Padovano (1262); Luchasio (1262-1300); Alberico da Barbarano Vicentino (1277-1298); Albertino (1286); Paganino Padovano (1287-1310); Pantalone (1297-1325); Gennajo (1303); Giovanni (1303); Vivarotto Amidano (1307-1328); Benedetto Bendididio da Porto Legnago (1276-1319); Spagnuolo di Giovanni (1311); Ottonello (1312-1333); Castellone (1315); Jacopo (before 1319); Corradino (c. 1318); Benevenuto (c. 1318); Rainiero di Manfredo (c. 1318); Bonincontro da Mantova (c. 1318); Anastasio da Ravenna (c. 1318); Domenico di Gerardo (1321); Pietro da Nicolo (1330); Ferrarino Trovati da Ferrara (1317-1330); Pietro da Valdezocca Padovano (1332-1360); Pietro da Sacile (1331-1334); Nicola da Padova (1350); Pietro di Lando (1343-1347). The professorship of a few of these grammarians is somewhat dubious, but the names of Boncompagno of Florence and Guizzardo (see pp. 49, 61) can perhaps be added to Gloria's list. For a list of the professors of medicine and surgery, see below, p. 309, and Gloria, Monumenti, 1222-1318, pp. 347-368, Monumenti, 1318-1405, I,

P-II-2

369-375, 444-447; to the thirteen whose professorship of medicine or surgery Gloria considered to be definitely established, he added the names of another five possible professors.

The four professors of logic named by Gloria are Tredecino (1262-1266); William of Brescia (1276-1281; the dates of William's stay at Padua are taken from G. Fowler, The Intellectual Interests of Engelbert of Admont [New York: Columbia University Press, 1947], p. 21, not from Gloria); Pace dal Friuli (? 1294-1319); and Odoardo (1307) (Gloria, Monumenti 1222-1318, pp. 368-369; see also P. 70). To them may be added Matteo da Roncagette (Gloria, Monumenti 1222-1318, p. 352, Documents, p. 59, and p. 70 above).

3. For the general history of the teaching of grammar, rhetoric and the closely associated ars dictaminis in the Middle Ages see Paul Abelson, The Seven Liberal Arts (New York: Teachers College, Columbia University, 1906, reprinted by Russell and Russell, 1965; Louis J. Paetow, The Arts Course at Medieval Universities, with Special Reference to Grammar and Rhetoric (Champaign, Illinois, 1910; reprinted Dubuque, Iowa: Wm. C. Brown Reprint Library, n.d.); and Jerrold E. Seigel, Rhetoric and Philosophy in Renaissance Humanism (Princeton: Princeton University Press, 1968), chapters VI and VII, where the medieval background is discussed. For Italy see also the informative article of Dr. Hélène Wieruszowski, "Rhetoric and the Classics in Italian Education of the Thirteenth Century," Studia Gratiana, XI (1967), Collectanea Stephan Kuttner, I, 169-208.

4. W. S. Howell, ed. and trans. The Rhetoric of Alcuin and

F-II-5

Charlemagne (Princeton: Princeton University Press, 1941), pp. 25, 62.

5. See James W. Thompson, The Literacy of the Laity in the Middle Ages, University of California Publications in Education, IX (Berkeley: University of California Press, 1939), pp. 53-55.

6. Ibid., p. 55.

7. Margaret F. Nims, trans. Poetria Nova of Geoffrey of Vinsauf (Toronto: Pontifical Institute of Medieval Studies, 1967), Introduction, pp. 11-12.

8. M. Sarti and M. Fattorini, De Claris Archigymnasii Bononiensis Professoribus, ed. C. Albicini and C. Malagola (2 vols. Bologna, 1888-1898), I, 599-602. However, Sarti and Fattorini do not seem to cite conclusive evidence to prove that the Gaufridus who taught at Bologna was the same as the author of the Poetria Nova, although such may well be the case.

9. Nims, Poetria Nova, Introduction, p. 10. The Rhetorica ad Herennium was universally accepted in the Middle Ages as a work of Cicero; possibly because of a belief that Cicero wrote it to replace his early work De inventione, it was often referred to as the Rhetorica nova (Ad. C. Herennium De Ratione Dictandi, Loeb Classical Library [Cambridge: Harvard University Press, 1954], Introduction, p. viii).

10. Gloria noted the presence of a grammaticus named Domenico at Sacco, near Padua, in 1108 (Monumenti, 1222-1318, p. 103) and the assertion of the priest Rufo that he frequented "the schools" at Grumolo,

F-II-4

near Padua in 1176; Gloria therefore concluded that if there were schools of grammar in the small towns near Padua, there were no doubt similar institutions in the city itself (*ibid.*, p. 113); he also cited the literature and latinity of the numerous Paduan notaries and judges in the twelfth century as further evidence to prove the same point. See also A. Barzon, "Tracce di una scuola episcopale in Padova (dal 800-1170)," Libri e Stampatori in Padova: Miscellanea in Onore di Mons. A. Bellini (Padova: Tip. Antoniana, 1959).

11. See pp. 57-58.

12. J. K. Hyde, Padua in the Age of Dante (Manchester, England: Manchester University Press and New York: Barnes and Noble, 1966), chapter X, "Padua and the Dawn of the Renaissance," perhaps tends in general to underestimate the viability and significance of the schools of liberal arts in Padua in the late thirteenth and early fourteenth centuries, although he notes the relationship of the faculty of arts to the development of humanism in Padua (*ibid.*, pp. 293-294).

In this connection, it may be observed that the chronicle of the Cortusi, which is a primary source for Paduan history between 1311 and 1368, does not single out law in describing the intellectual life of the city; instead, it is noted that at the beginning of that period, Padua was endowed with "Sapientibus viris, doctoribus in qualibet arte liberali. . . ." (Cortusi Patavini . . . Historia de novitatibus Paduae et Lombardiae. . . ., RIS, XII, Part V[Bologna: Zanichelli, 1941], 1.11, p. 12).

F-II-5

13. Rolandino "received the office of master" from Boncompagno at Bologna in 1221 (Rolandino, *Cronica*, 10.4, p. 135); he is described as "magister" in a notarial document of March 27, 1229 (Gloria, Monumenti 1222-1318, p. 8, quoted in A. Bonardi, ed. Rolandino apud Muratori, Preface, p. vii); he is called "magister grammaticae" in a document of 1238 referred to, but not printed, by Gloria (Monumenti, 1222-1318, p. 372, citing Museo Civico, Padua, Diplomatico, n. 1606, 1608, also quoted by Bonardi). Rolandino's epitaph, several times printed, most recently by Gloria (Monumenti, 1222-1318, p. 372) is dated 1276 and refers to him as "Grammaticae doctor simul artis rhetoricum." The question as to whether Rolandino did or did not continue to teach in the schools of Padua throughout the tyranny of Ezzelino da Romano (1237-1250) was the subject of a vigorous controversy during the last century between A. Gloria and H. Denifle. See G. Arnaldi, Studi sui Cronisti della Marca Trevigiana nell'età di Ezzelino da Romano, Istituto Storico Italiano per il Medio Evo. Studi Storici, Fasc. 48-50 (Rome, 1903), p. 83, for an account of this dispute.

14. See above, note 1.

15. See p. 63.

16. Hyde, Padua in the Age of Dante, p. 294. Mention may also be made of a certain magister Motanario, author of a poem entitled De luna cleri, who appears to have flourished at Padua before the first decade of the fourteenth century, when Geremia da Montagnone included some lines of the poem in a florilegium (see above, pp. 65-66). The

F-II-6

identification of Montenario with the ~~magister~~ Dominicus named by Rolandino as present at the reading of his chronicle in 1262 is without foundation, according to Gloria (Monumenti 1222-1318, p. 373), although apparently tacitly accepted by Dr. Hyde (Padua in the Age of Dante, p. 294).

17. Seven are named in the sources as having taught both subjects (the six listed by Rolandino together with Benedetto Bendidio da Porto Legnago, whose epitaph referring to him as "grammaticae doctor, interpretethororum," is printed in Gloria, Monumenti 1222-1318, p. 379); it seems safe to assume that the three grammarians addressed in verse by the poet Mussato (see above, pp. 61-67) had literary interests and were probably also teachers of rhetoric. See C. S. Baldwin, Medieval Rhetoric and Poetic (New York: Columbia University Press, 1928, reprinted Gloucester, Massachusetts: Peter Smith, 1959), preface, p. ix; this author remarks (p. 195) on the vagueness of the boundary between poetria and rhetoric.

18. See Abelson, The Seven Liberal Arts, pp. 36-40, 42-45, for a description of these works and an account of their wide popularity.

19. R. Biblioteca Universitaria di Padova, Trascrizione testuale della vecchi schede dei manoscritti (Padua, 1907-1908), Nos. 1391, 1440 and 808.

20. See Abelson, The Seven Liberal Arts, pp. 49-50. The work survives in numerous manuscripts but has never been printed in full; a portion of it was published in an incunabula edition as De intricacionibus numeralium vocabulorum (Hain, 16082, n.p., n. d.). See also V. Rossi

F-II-7

"Per una edizione delle *Magnae derivationes* di Uguccione di Pisa,"
Atti del III Congresso di Studi Romani (Rome, 1935), pp. 42-46.

21. For Papias and his lexicon see Abelson, The Seven Liberal Arts, p. 49. A catalogue of the library of the Convent of St. Antony in Padua compiled in 1396 is printed together with a catalog of 1449 in K. W. Humphreys, The Library of the Franciscans of the Convent of St. Antony, Padua, at the Beginning of the Fifteenth Century, *Studies in the History of Libraries and Librarianship*, Vol. III (Amsterdam: Erasmus Booksellers, n.d. [1966.], 400 copies printed). A comparison of the two catalogues shows that the number of books in the library on the liberal arts was strikingly increased between 1396 and 1449. The references to the copies of Uguccio and Papias possessed in 1396 are at p. 27, nos. 33 and 34, and p. 366, no. 62.

22. B. Scardeone, Historia urbis Patavi, in J. G. Graevius, ed. Thesaurus antiquitatum et historiarum Italiae (Leyden, 1704-1723; hereafter cited as Graevius), VI, Part 1, col. 232. Scardeone claimed to possess a copy of Jacopo's summary of Uguccio dated 1372. Jacopo died in 1359, but conceivably the date could be that of copying. For Jacopo's career and other writings, see below, pp. 155-157, 299.

23. Ibid., cols. 257-259.

24. For general accounts of Boncompagno's life and writings see K. Sutter, Aus Leben und Schriften des Magisters Boncompagno (Freiburg im Breisgau und Leipzig, 1894); L. Rockinger, Briefsteller und Formelbücher des elften bis vierzehnten Jahrhunderts, Quellen und

F-II-8

~~Erörterungen zur~~ Bayerischen und Deutschen Geschichte, IX (1863);

A. Gaudenzi, "Sulla cronologia delle opere dei Dettatori Bolognesi da Boncompagno a Bene di Lucca," Bullettino dell'Istituto Storico Italiano, No. 14 (1895), 85-174, and Wieruszowski, "Rhetoric and the Classics in Italian Education."

25. Remarking on his own continued affection for the Bolognese, despite hostility between the cities of Bologna and Padua, Rolandino wrote: "Apud ipsos Bononenses in scientia litterarum nutritus in Anno Domini MCCXXI, illic a Boncompagno meo dompno et magistro, natione et eloquencia florentino, licet indignens, recepi officium magistratus" (Rolandino, Cronica, 10.4, p. 135).

26. Boncompagni, Boncompagnus, in L. Rockinger, Briefsteller und Formelbucher, p. 174. It is possible that both Boncompagno and Rolandino were among the scholars who migrated from Bologna to Padua in 1122, but there is no evidence for this. Boncompagno is not listed as a professor at Padua by Gloria.

27. Extensive extracts from the Boncompagnus (the title Boncompagno himself gave to the work) are printed in Rockinger, Briefsteller und Formelbucher, pp. 128-174; it appears never to have been printed in full. The Rhetorica Novissima is edited in A. Gaudenzi, ed. Bibliotheca Iuridica Medii Aevi: Scripta Anecdotorum Antiquissimorum Glossatorum (Bologna, 1892), II, 251-297. The dates of both works are supplied by internal evidence: the explicit of the Boncompagnus states that at Bologna in 1315, "Recitatus equidem fuit hic liber . . . approbatus coronatus lauro" (Boncompagnus, Rockinger, p. 174); that

F-II-9

of the Rhetorica Novissima that in 1235 "Data est hec rhetorica Bononie" (Rhetorica Novissima, p. 297).

Boncompagno was also the author of an account of the siege of Ancona (1173) (Liber de obsidione Anconae, ed. G. C. Zimolo in Muratori, RIS, VI, Part 3 [Bologna: Zanichelli, 1936-1937]), and of a number of brief treatises on various aspects of the ars dictaminis as well as of works on the Ciceronian themes of friendship and old age. Boncompagno's minor works are listed, dated, and described in detail in Gaudenzi, 'Sulla cronologia delle opere dei dettatori Bolognesi,' pp. 103-107.

28. Wieruszowski, "Rhetoric and the classics in Italian education," p. 176.

29. Boncompagno, Rhetorica Novissima, Proemium, p. 252.

30. The educational theory of the school of Orleans, Boncompagno characterized as "falsam et supersticiosam Aurelianensium doctrinam" in the prologue to his Liber X tabularum (quoted in Wieruszowski, "Rhetoric and the classics in Italian education," p. 176, n. 9). An indication that the merits of various types of rhetoric continued to be discussed at Padua in the fourteenth century is perhaps to be found in the existence of a fourteenth-century manuscript of probable Paduan provenance of a work by Bene Bononiensis, that is, presumably, Bene of Lucca, a dictator and rival of Boncompagno, who taught at Bologna in the first half of the thirteenth century. The work is entitled, "Summa super stylo dictaminis Aurelianensi videlicet Tulliano ac Romanae curiae potissimi," and presumably discusses the highly literary rhetoric evolved in the schools

of Orleans and the epistolary style developed in the Roman Curia (Venice, Biblioteca Marciana, Appendice Codice Latine, Class XI, Cod. 7 (4506) and Tomasini, Bibliotece Patavine Manuscripta (Udine, 1639), p. 27, cited in P. O. Kristeller, Iter Italicum [London: The Warburg Institute, Leiden: E. J. Brill, 1967], II, 238).

31. Wieruszowski, "Rhetoric and the classics in Italian education," pp. 179-180; Rockinger, p. 130. Knowledge of a few tags from classical authors or of anecdotes from their biography does not, of course, necessarily imply extensive reading, but Sallust and Livy, at least, he appears to have known well.

32. G. Arnaldi, Studi sui cronisti della Marca Trevigiana nell'età di Ezzelino da Romano, Istituto Storico Italiano per il Medio Evo. Studi Storici, Fasc. 48-50 (Rome, 1963), pp. 158-160, citing Rolandino, Cronica, p. 135 (see above note 25).

33. "Liberalium artium imperatrix et utriusque juris alumna" (Boncompagni, Rhetorica Novissima, 2.1, p. 254). The expression "liberalium artium imperatrix," is also used of rhetoric in the Proemium of the Boncompagnus (Rockinger, p. 129).

34. It was, of course, only one of a number of such manuals, which appear to have been much used in the schools, especially of Italy, in the twelfth and thirteenth centuries. See C. H. Haskins, Studies in Medieval Culture (Oxford: Clarendon Press, 1929), chapter IX, "The Early Ars dictandi," p. 170 ff.

F-II-11

35. Excerpts from Boncompagno's letters on these ever-popular subjects are printed in Haskins, Studies in Medieval Culture, pp. 13, 18, 28.

36. The table of the contents of the Boncompagnus, including the title of each brief chapter within its six books, is reproduced in Rockinger, pp. 133-138.

37. As already noted, the so-called Rhetorica Antiqua of Boncompagno (that is, the work formally approved at Padua) was by him entitled Boncompagnus.

38. "Instrumentum rhetorice facultatis est oratio" (Boncompagno, Rhetorica Novissima, 2.5, p. 256).

39. Ibid., 3.1, p. 257.

40. "Sedet orator pro tribunali et quoslibet ad oratoriam facultatem invitat, allegans quod nemo potest in aliquo recte loqui seu gloriose vocis munimine roborari, aut habere copiam in dicendo, vel dulci sermone, suasibili exordio, et affabili oratione alicui suadere sine documento rhetorice facultatis" (ibid., 4.5, p. 268).

41. "Quis vix aut numquam est aliquis adeo inscius, qui suam ignoret pecuniam numerare" (ibid.). Boncompagno also referred to the liberal arts in a collection of sample openings for speeches. The paragraphs in question are broad generalizations, noteworthy only for the mention of the astrolabe under astrology (ibid., 5.9, p. 271).

42. The titles of the books of the Rhetorica Novissima are as follows: (1) De origine iuris; (2) De rhetorice partibus et causarum

F-II-12

generibus; (3) De definitionibus; (4) De naturis et consuetudinibus oratorum; (5) De causarum exordiis; (6) De principiis conventatorum; (7) De rhetoricis argumentis; (8) De memoria; (9) De orationibus; (10) De invectivis; (11) De consiliis; (12) De colloquiis, and (13) De cotionibus.

43. The exordium was one of the five parts into which letters were usually divided by the masters of dictamen, namely, salutation; exordium, or opening generalization, proverb, or quotation; narration; petition; and conclusion. See Haskins, Studies in Medieval Culture, p. 6.

44. "Unde magistrum B, fratrem et socium nostrum et in hac facultate satis instructum mihi heredem instituo et principalissimum successorum, deprecans ut sub eius debeatis ferrula militare" (Boncompagno, Rhetorica Novissima, b.1, p. 273). For Rolandino's reception of the office of master, see note 25.

45. Rolandino held the office of notarius in officio sigilli (that is, he was charged with responsibility for the official city seal) in 1231 and 1237. He appears to have been still practicing as a notary in 1267, when he witnessed a document purporting to give an account of a miracle (Gloria, Monumenti 1222-1318, pp. 371-372).

46. Arnaldi, "Studi sui cronisti," pp. 159-160.

47. Gloria, Monumenti 1318-1405, I, 518, where it is stated that "la scuola della notaria era addetta alla università degli artisti," and that Nicolò dal Cadore, referred to as lector artis notarie in a notarial document of 1341, is the first known professor of that subject

at Padua.

48. Rolandino, Cronica, 12.19, pp. 173-174, where the regent masters of liberalium arcium de studio paduano are said to have "authenticated" the work. The nature and implications of that public approval are extensively discussed in Arnaldi, "Studi sui cronisti," pp. 80-95; on this see also Lynn Thorndike, "Public readings of new works in medieval universities," Speculum, I (1926), 101-103. For a possible use of Rolandino's history as a text in rhetoric, see Arnaldi, "Studi sui cronisti," p. 95.

49. Arnaldi, "Studi sui cronisti." This conclusion is not accepted in Hyde, Padua in the Age of Dante, p. 288.

50. See above, note 27.

51. "Scribo quoque prosayce hac de causa, quia scio, quod dixero, posse dici a me prosam plenius quam per versus, et cum sit his temporibus dictamen prosaicum intelligibilius quam metricam apud omnes. Sed utinam viveret Virgilius vel Lucanus, quoniam imposito michi digne silencio, copiosam haberent materiam quia suum possent altum ingenium exercere. . . . Nam forte non erit inutile vel delectabile minus aliquibus et precipue litteratis, id quod de modernorum iniuriis et laboribus scriptum per latinum invenient, quam quod de gestis nobilium antiquorum audiunt per vulgare, quod dirimatum vulgo dicimus et romanum" (Rolandino, Cronica, Proemium, p. 8).

52. "Hec vel his similia locuturus. . . . (Rolandino, Cronica, 1.5, pp. 19-20).

\$-II-14

53. Ibid., 4.10, p. 64; 4.12, p. 66; 6.4, p. 89; 6.17, p. 99; 6.18, p. 99; 7.8, p. 106; 9.1, p. 122; 9.5, p. 126; 10.2, p. 146; 13.1, p. 159.

54. Ibid., 6.4, pp. 89-90.

55. No comprehensive study of the Paduan humanist circle has appeared, although there are numerous articles on various aspects of the topic. See below, notes 58, 61, 64. Recent studies of Lovati and Mussato are, respectively: R. Weiss, "Lovato Lovati (1241-1309)," Italian Studies, VI (1951), 3-28, which contains useful bibliography and M. Dazzi, Il Mussato pre-umanista (1261-1329): l'Ambiente e l'Opera (Venice: Neri Pozzi, Editore, 1964), which contains an Italian translation of some of Mussato's poems and of brief selections from his histories.

56. See above, pp. 58-59.

57. The terms Guelph and Ghibelline, by the time Lovato wrote, still carried some connotation of allegiance to the papacy and empire respectively, but were also often used to denominate purely local political factions in the Italian cities. For Lovato's lost works, which were cited by Geremia da Montagnone, see Weiss, "Lovato Lovati," pp. 11-12.

58. The texts of Lovati's known surviving poems are printed in C. Foligno, "Epistole inedite di Lovato de' Lovati e d'altrui a lui," Studi Medievali, II (1906-1907), pp. 255-262; F. Novati, "Nuovo aneddotti

F-II-15

sul cenacolo letterario padovano del primissimo Trecento," Scritti storici in memoria di Giovanni Monticolo (Venice, 1922), pp. 167-192, and L. Padrin, Lupati de Lupatis, Bovetini de Bovetinis, Albertini Mussati necnon Iamboni Andreae de Favafuschia carmina quedam ex codice Veneto nunc primum edita (Nozze Giustini-Giustiniani, Padua, 1887). I have not seen the last-named rare privately printed pamphlet which does not appear to be available in this country. A microfilm has been ordered for the Columbia University Library (information in conversation with Professor P. O. Kristeller), but had not arrived at the time of writing.

59. Cod. Vat., 1769 c. 246 A-B, "Nota domini Lovati iudicis et poete patavi," cited in F. Novati, "Nuovi aneddoti," p. 178, where the contents of the note are described.

60. Mussato, Evidentia tragediarum Seneca, printed in Novati, "Nuovi aneddoti," p. 187.

61. "Fuit nuper poetarum omnium quos nostra vel patrum nostrorum vidit etas facillime princeps, nisi iuris civilis studium amplexus et novem Musis duodecim tabulas immiscuisset. . . ." (Petrarch, Rerum memorandarum, 2.61, quoted in Gius. Billanovich, "I primi umanisti e le tradizioni dei classici Latini," Discorsi Universitari, nuova serie, [Fribourg, Switzerland: Edizione Universitarie, 1953]).

F-II-16

62. Weiss, "Lovato Lovati," p. 10, where it is noted that this document is referred to in L. Thorndike, "Relations of the Inquisition to Peter of Abano and Cecco d'Ascoli," Speculum I (1926), 338-343. Thorndike cites S. Orsato, Historia di Padova (Padua, 1678), according to which reference is made in a document of May 22, 1307 (now lost) to "Sapientes electi ex vigore reformationis factae in favorem Petri de Abano," one of whom was apparently Lovati. I have not been able to consult Orsato's work.

63. Weiss, "Lovato Lovati," pp. 16-17.

64. Guido Billanovich, "Veterum vestigia vatum' nei carmi de preumanisti padovani," Italia medioevale e umanistica, I, (1958), 155-247. The "rediscovery" of poetic works of Roman antiquity, in the Middle Ages as in the so-called Renaissance, nearly always implies only that attention is given to hitherto neglected manuscripts. As C. H. Haskins remarked, "The body of Latin classics potentially available to the twelfth century was much the same as that available today, for nothing of importance has been lost, so far as we know, and little has been transmitted to us by other means than the manuscripts then in the libraries of Western Europe. Potential access does not, however, mean actual use, for many codices lay unknown and neglected. . . ." (The Renaissance of the Twelfth Century [New York: Meridian Books, 1947], pp. 104-105).

65. Metric epistle, "Lovatus ad Bellinum," in Foligno, "Epistole inedite," pp. 49-50.

F-II-17

66. Leyden University Library, Cod. Lat. 440, sec. xiv, Italian provenance (J. Geel, Catalogus Librorum Manuscriptorum qui inde ab anno 1741 bibliotheca Lugduno Batavi accesserunt [Leyden, 1852], p. 132), described in F. Novati, "Nuovi aneddoti," p. 172.

67. The date is often given as 1261, but A. Zardo, Albertino Mussato: studio storico e letterario (Padua, 1884), p. 8, maintains that 1262 is correct.

68. "Scribebat Catones," Zardo, Mussato, p. 21. According to Gloria, Monumenti, 1222-1318, pp. 475-476, a certain Albertino "dottore della grammaticale facoltà," witnessed two documents at Monselice, one of the towns of the Paduan contado in 1286. There is, however, no evidence to identify this person with Mussato.

69. " Magister

O, mea quem coluit prima juventa, vale"

Albertino Mussato, metric epistle, "Ad magistrum Bonincontro Mantuanum Grammaticae Professorem" in Graevius, VI, Part 2, col. 50, referred to in Hyde, Padua in the Age of Dante, p. 293. All future citations of the poems of Mussato are from the edition of Graevius.

70. For Mussato's biography, see Dazzi, Il Mussato preumanista and Zardo, Mussato, passim.

71. Printed in Graevius, VI, Part II.

72. Ibid., and L. Padrin, ed., Sette libri inediti del De Gestis Italicorum post Henricum VII, Monumenti della R. Deputazione Veneta di

Storia Patria, Series 3, Cronaca e diarii, III (Venice, 1903).

73. L. Padrin, ed. Ecerinide (Venice, 1900).

74. Printed in Graevius, VI, 2, cols. 43-64.

75. The date usually given is 1315. In P. H. Wicksteed and E. G. Gardner, Dante and Giovanni del Virgilio (London, 1902), pp. 43-44, it is maintained that the coronation took place in 1314 and that Mussato's poem to the College of Arts was written to commemorate the first of the annual ceremonies that took place thereafter. The text of the poem appears to bear out the latter part of this assertion.

76. "Ad Collegium Artistarum" Graevius, VI, Part 2, cols. 55-56.

77. "Metra Sophoclaeis non sunt suffulta cothurnis

Haec tua, quidquid habes, lingua Latina dedit.

Sola rudis, tantum studiis innixa Latinis

In Latius oris nunc nova miles eris.

Felix, invidia quod tu mordebere nulla.

Ista Dei tantum munera pauper habet." (Ibid).

78. Wieruszowski, "Rhetoric and the Classics," pp. 185-187.

79. Mussato, "Ad collegium artistarum," lines 36-39.

80. M. Dazzi, Il Mussato preumanista, p. 185.

81. "Interpellasti me . . . Marsilii" (Mussato, Evidentia Tragediarum Seneca, in Novati "Nuovi aneddoti," p. 187).

82. "Puto ut te philosophiae naturalis frequentia observantem studia plerunque, refocillares, seu ut oame sub quoquam descriptum grammate oculis tuis subiectum, ad mare tue aviditatis accederet" (*ibid.*). See also A. Gevirth, Marsilius of Padua, the Defender of Peace (New York: Columbia University Press, 1951), pp. 20-21, for the career of Marsiglio before he became Rector of the University of Paris in 1313. Mussato also addressed two poems to Marsiglio (Graevius, VI, Part 2, cols. 48-59 and 51); see also below, pp. 301-302.

83. "Ad Magistrum Bonincontrum," and "Ad Joannem, grammaticae professorem" (Graevius, VI, Part 2, col. 50).

84. "Ad Joannem Grammaticae Professorem docentem Venetiis," (Graevius, VI, 2, col. 40-41),

85. "Virgilius thalamo necum versatus in uno

Tempore, quo Patava pulsus ab Urbe fui.

Exul ad externas ultro se contulit oras,

Exilii poenas sustinuisse volens.

In Patriam redii, redeat securus et ipse,

Et comes et Civis sit, velut ante fuit."

"Ad Magistrum Guizardum Grammaticae Professorem" (Graevius, VI, 2, col. 50).

86. See V. Colfi, Di un antichissimo commento all' Ecerinide del Mussato (Modena, 1891). Unfortunately I only learned of the existence of this work after returning from Italy and has been unable so far to obtain access to a copy in this country. It is here cited

from Dazzi, Il Mussato preumanista, p. 52. No reference to any grammarian named Guizzardo at Bologna in the early fourteenth century is to be found in M. Sarti and M. Fattorini, De claris Archigymnasi Bononiensis Professoribus, although at I, 586, reference is made to a Guizzardus who taught geometry in 1304. Gloria, Monumenti, 1222-1318, and Monumenti 1318-1405, does not list Guizzardo as a professor at Padua.

87. Graevius, VI, 2, col. 44-45 and 51-52.

88. "Rhetorici et oratores . . . isti sunt illi de quibus scribitur 2^o Metaphisici quod quidam non admittunt dicentes nisi exemplariter dicant. Alii autem dignantur semper recipere testimonium poetarum . . . Avicenna cum sua famositate in philosophia dicit hominem ex terra posse generari sicut mures et alia multa similiter per natura aliquibus accidit qui non credant aliquid nisi ex testimonio poetarum" (Aristotelis stagirite philosophorum summi problematis atque divi Petri Aponi Patavini eorundem expositiones. . . . [Mantua, 1475; A. C. Klebs, Incunabula Scientifica et Medica (Bruges: St. Catherine's Press, 1938, hereafter cited as Klebs, 776.1], 18.3). This work is hereafter referred to as Expositio Problematum Aristotelis and all future citations are from the editio princeps, which I have consulted at the Pierpont Morgan Library, New York. Since the volume is without folio or signature numbers, references are to particula (that is, book) and problem numbers only.

Peter of Abano was probably born at Abano near Padua about 1250 (according to Thorndike, History of Magic, II, 876; Duhem, Système du Monde, IV, 245, puts forward an argument in favor of 1257). As a young man he visited Constantinople, where he learned Greek.

F-II-21

Before 1295 he went to Paris, where he taught in the schools for a number of years. He appears to have returned to Padua in about 1306, and to have been professor of medicine, philosophy, and astrology there until his death, which occurred probably in 1316. Peter's principal work, other than the Expositio Problematum Aristotelis, mentioned above, is the Conciliator differentiarum et praecipue medicorum, a work intended to discuss and where possible reconcile the differences between philosophers and physicians. He was also the author of astrological works, namely, De motu octave sphere, the Lucidator dubitabilium astronomie, and a collection of Imagines. In addition, he wrote treatises on physiognomy and poisons, and compiled additions to the materia medica of Mesue and Dioscorides. He also appears to have translated into Latin from Greek several Galenic works and the so-called problems of Alexander of Aphrodisias; and he translated a group of treatises by the Jewish astrologer Abraham aben Ezra into Latin from a defective French version. The Expositio Problematum Aristotelis, the Lucidator and the treatise on poisons were definitely completed after Peter's return to Padua, and parts of the Conciliator were also probably written there. (Bibliographical material concerning Peter's works is noted in the following paragraph. Detailed citations of the editions and manuscripts used in preparing the present study are supplied in the notes when individual items are referred to.)

Of the various accounts of Peter's life and writings, the most helpful is Lynn Thorndike, A History of Magic and Experimental Science (New York, 1923), II, 875-946. It contains a useful bibliography of Peter's works and of secondary material regarding him, but is superseded

as far as manuscripts are concerned by the same author's "Manuscripts of the writings of Peter of Abano," Bulletin of the History of Medicine, XV (1944), 201-219. Also to be consulted is Sante Ferrari, I tempi, la vita, le dottrine di Pietro d'Abano, Atti della R. Università di Genova, XIV (Genoa, 1900). This work, the only full scale biography of Peter aroused considerable controversy because of the author's contention that Peter was a religious skeptic and an Averroist. As a reply to his critics, Ferrari published Per la biografia e per gli scritti di Pietro d'Abano (Rome, 1918). Peter of Abano's thought is discussed in detail and his supposed Averroism fairly conclusively disproved in Bruno Nardi, Saggi sull'aristotelismo Padovano dal secolo 14 al secolo 16 (Florence: Sansoni, 1958), which incorporates articles originally published by Nardi in periodicals in the early years of this century. L. Norpoth, "Zur Bio-Bibliographie und Wissenschaftslehre des Pietro d'Abano, Mediziners, Philosophen, und Astronomers im Padua," Kyklos: Jahrbuch für Geschichte und Philosophie der Medizin, III (1930), 292-353 (also Leipzig dissertation, same year) adds some new material, especially as regards bibliography, but is largely based on the work of Ferrari, Thorndike and Nardi. For manuscripts of Peter's works the reader is referred, in addition to the sources mentioned above, to Lynn Thorndike and Pearl Kibre, A Catalogue of Incipits of Medieval Scientific Writings in Latin (Cambridge, Massachusetts: Medieval Academy of America, 1963); hereafter referred to as TK.

89. Peter of Abano, Conciliator differentiarum et praecipue medicorum (Venice, 1496; Klebs 773.5), Differentia 1, fol. 2v,

where the reader is referred to Diff. 135 (fol. 186v-187v) which discusses the role of confidence in medicine. All future citations of the Conciliator refer to this edition which I have consulted at the New York Academy of Medicine.

90. "Sententias nam verborum per intelligere oportet: ut commode possit suos conceptos aliis exprimere eosque pronunciantes intelligere. Hoc autem sit per grammaticam" (ibid., Diff., 1, fol. 2v.

91. Two manuscripts of his poem on the Feast of the Purification in the Biblioteca Marciana are cited in Kristeller, Iter Italicum, II, 219 and 241; according to M. Dazzi, Il Mussato preumanista, p. 99, the verses are printed in Ughelli, Italia Sacra (Venice, 1729), V, 98, and elsewhere. For Pace dal Friuli's verses in praise of the Venetian republic, see L. Iazzarini, Paolo di Bernardo e i primordi dell' unanimesimo in Venezia (Venice, 1930), p. 15. Also cited in Hyde, Padua in the Age of Dante, p. 294.

92. Gloria, Monumenti, 1222-1318, p. 369 and Monumenti, 1318-1405, I, 487.

93. Gloria, Monumenti, 1222-1318, documents, p. 65, doctorate of Aymericus of Polonia, April 23, 1307.

94. For Giovanni del Virgilio and his works see P. H. Wicksteed and E. G. Gardner, Dante and Giovanni del Virgilio (London, 1902), where some of Giovanni's poems are printed.

95. P. O. Kristeller, "Un 'ars dictaminis' di Giovanni del

F-II-24

Virgilio," Italia Medievale e Umanistica, IV (1961), p. 183, note 5, where the relevant passages of the document concerning his appointment are reproduced.

96. Ibid., p. 182, note 2, where the relevant document is partially reproduced.

97. Biblioteca degli Oratoriani di Napoli, cod. MCF I-16 (X 16), 1489, fols. 74v-75r: "Iste Virgilianus . . . legit quippe Bononiae, Paduae et Faentinae tempore quo de Bononia exulavit pars gebillina," and "maiores sui fuerint Paduani. . . ." This manuscript, which I have not seen, is described and the passage above quoted in G. Billanovich, "Giovanni del Virgilio, Pietro da Muglio, Francesco da Piano," Italia Medievale e Umanistica, VI (1963), 203-234, especially pp. 225-228. Faenza is said by Billanovich (p. 229) to be a mistake for Cesena.

98. Ibid., p. 229. There is some evidence that Pietro da Muglio expounded the works of recent vernacular poets, including Giovanni del Virgilio and Dante (ibid., p. 206).

99. Kristeller, "Un 'ars dictaminis,'" p. 183. Billanovich, "Giovanni del Virgilio," p. 232.

100. The poem, which contains flattering references to Rinaldo dei Cenci of which Giovanni later proclaimed himself ashamed, was apparently not sent to Mussato until 1327, (Albini, "L'ecloga di Giovanni del Virgilio ad Albertino Mussato," Atti e Memorie della R. Deputazione di storia patria per le provincie di Romagna, Series 3, XXIII [1905], 247, and Kristeller, "Un 'ars dictaminis,'" p. 183).

F-II-25

101. "Unde mihi dudum conceptus duplicat ardor

Quem tandem explebo fors individua ni vetet, ejus

Conspectu placido placido [sic] quoque fame pasci."

(Giovanni del Virgilio to Albertino Mussato, in Wicksteed and Gardner, Dante and Giovanni del Virgilio, pp. 188-189 [Latin and English lines, 197-199]).

102. By Billanovich ("Giovanni del Virgilio," p. 232).

103. Kristeller, "Un 'ars dictaminis,'" p. 183.

104. See E. Carrara, "Il Diaffronus di Giovanni del Virgilio," Atti e memorie della R. Deputazione di storia patria per la Romagna, Series 4, XV (1925), 1-5.

105. F. Ghislaberti, "Giovanni del Virgilio espositore della 'Metamorfosi'," Giornale Dantesco, XXXIV, New series, IV, 1933, 3-107. Extensive extracts from the commentaries are printed in this article.

106. Kristeller, "Un 'ars dictaminis.'" The text is printed at pp. 193-200.

107. By Ghislaberti, "Giovanni del Virgilio," p. 35.

108. John of Garland, who died ca. 1252, does not himself appear to have taught at Orleans, but placed an emphasis on the study of the poets similar to that of the Orleans masters. He taught at the universities of Paris and Toulouse, where he was among the last exponents of the literary humanism characteristic of the twelfth century. According to a recent scholar (E. F. Wilson, ed. The Stella Maris of John of Garland [Cambridge, Massachusetts: Medieval Academy of America, 1946],

F-II-26

p. 77) no biographical details can be added to those supplied by L. J. Paetow. See Paetow, Arts Course, p. 17.

109. This work is described and analyzed in detail in R. Weiss, Il primo secolo dell'umanesimo: studi e testi (Rome: Edizioni di Storia e Letteratura, 1949), pp. 23-47. According to Weiss, Geremia's florilegium was printed under the title Epithomia Sapientiae (Venice, 1505). At the time of writing I have not succeeded in locating a copy in this country.

110. Weiss, Il primo secolo, p. 23.

111. "Utile et quasi necessarium fore existandum est ad moralium notabilium scientiam atque memoriam facilius habendam. . . ." (Geremia da Montagnone, Compendium Moralium Notabilium proemium, quoted in Weiss, Il primo secolo, p. 25).

112. Weiss, Il primo secolo, p. 29.

113. Ibid., pp. 35-42, where a detailed account of the numerous authors and works known by Geremia is given.

114. Rolandino himself; Domenico, one of the professors of grammar and rhetoric in 1262 named by Rolandino; and Pace dal Friuli (Gloria, Monumenti 1222-1318, pp. 369, 371-372, 373). Pace dal Friuli was in addition, as already noted, a poet.

115. "Qui cum medici dicantur et sint nomines literati legunt omnia, Aristotelem, Tullium, Senecam, Virgilium, quin et dialecticae inhiant et rhetoricae et poeticae et astrologiae quodque est peius alchimiae, solam negligunt medicinam. (Quoted in Thorndike, History of

F-II-27 Magis, III, 221, citing Petrarch, Ep. Senil. 14.16, where, however, I have been unable to find it.)

116. See p.60.

117. See note 51 above. According to Arnaldi, "Studi sui cronisti," p. 143, the reference to a vernacular "quod dirimatum vulgo dicimus et romanum" may refer to French prose romances on historical topics.

118. "Pontibus irriguam spatiar forte per urbem,
Que tribus a vicis nomen tenet, oia passu
Castigans modico, cum celas in sede theatri
Karoleas acies et gallica gesta boantes
Cantorem aspicio. . . ."

("Lovatus ad Bellinum," lines 1-5, in Foligno, "Epistole inedite," p. 49). The editor suggests that "Karoleas acies" is a reference to Charles of Anjou, but it seems equally likely that Charlemagne was intended, in view of the popularity of the Charlemagne legend in Italy. Lovato himself, of course, wrote a Latin epic on a subject taken from French romance (see above, p. 56) and the poem just quoted concludes with a defense of the suitability of such topics for Latin verse.

119. According to Billanovich, "I primi umanisti," p. 17., British Museum Ms. Add. 19906 contains Justin's epitome of the history of Pompeius Trogus, the De temporibus of Bede, a group of poems and a collection of dictaminal formulae copied in Lovato's own hand about 1290.

F-II-28

120. Expositio Problematum Aristotelis, Fol. 3.2.

121. Ibid., 18, 1.

122. "Idem volo quod omnes libri Historie Romanæ, et cujuscunque alterius Historie, preterquam sacre Scripture, et omnes libri Senecæ, qui sunt vel erunt apud me, renuntiantur et restituantur Domino Paulo di Comite, nepoti meo." (Will of Ildebrando Conti, January 17, 1339, printed in F. S. Dondi, Orologio, Dissertazione Ottave sopra l'istoria ecclesiastica di Padova [Padua, 1815], p. 131.)

123. J. Valentinelli, Bibliotheca Manuscripta ad S. Marcum Venetiarum (Venice, 1868-1873), VI, 63, Class 22, Cod. 103, saec. XIV, Liber historiarum Alexandri Macedonis, "nationis polonae, bibliothecam Padua spectebat, antequam eius gymnasii bibliothecae tribueretur."

124. See above, p. 79, note 2.

125. "Magister Tredicius, in logica providus indagator et doctor" (Rolandino, Cronica, 12.19, pp. 173-174).

126. Engelbert wrote an account of his own life and works in the form of a letter to his friend, Master Ulrich, in which he stated: "Continuavi ibidem (sc. Padua) in logica et philosophia quinque annis sub Magistro Wilhelmo de Brixia tunc acto ad salarium legente ibidem, viro magnae reputationis." (G. Fowler, The Intellectual Interests of Engelbert of Admont [New York: Columbia University Press, 1947], pp. 21-22, quoting "Engelberti epistola ad magistrum Ulricum," in B. Pez, Thesaurus anecdotarum novissimus (Augustae Vindelicorum 1721-1729), I, 1,

F-II-29

cols. 428-436 at col. 430. Engelbert, who also studied at Prague, was the author of a number of treatises on natural science and of Aristotelian commentaries (see below, p. 212).

127. For William's biography and writings, see G. Sarton, Introduction to the History of Science (3 vols., Baltimore, Maryland: Williams and Wilkins for the Carnegie Institute of Washington, 1927-1948), II, Part 2, 1027-1028.

128. To spend a few years in logical teaching before proceeding to a career in the 'higher' faculties was a common practice for professors in medieval studia. See D. Knowles, The Evolution of Medieval Thought (New York: Vintage Books, 1964), p. 225.

129. Matteo's epitaph runs:

"Mirus Aristotilis superandus et Galieni

Interpres loyce gloria victa jacet

In cunctis cathedre Patavis decus iste Matheus

de Ronchalitre phebuis in urbe nitens"

(Gloria, Monumenti, 1222-1318, Documents, p. 59. According to Colle (Storia Scientifico-Letteraria, III, 168) and earlier writers, manuscripts of Aristotelian commentaries by Matteo survived in the seventeenth century. They do not appear to be extant today.

130. Gloria, Monumenti, 1222-1318, Documents, p. 65. For Pace dal Friuli, see above p. 63.

131. "Quia nunquam sciri potest scientia medicinae nisi de

F-II-30

scientia logicali praescribatur. . . ." (H. Conring, De Antiquitatibus Academicis Dissertationes Septem (Gottingen, 1739), pp. 60-61, cited in Kibre, "The Faculty of Medicine at Paris, Charlatanism and Unlicensed Medical Practices in the Later Middle Ages," Bulletin of the History of Medicine, XXVII, No. 1 (January-February, 1953), p. 4. See also Rashdall, Universities, I, 76.

132. Fols. 2r-3r.

133. As already noted, the idea goes back to Isidore of Seville and beyond. See above, p. 2 and note 3.

134. Conciliator, fols. 3r-4r.

135. "Logica cum sit omnis scientiarum velut sal ciborum conditiva." Conciliator, fol. 3r.

136. The Conciliator bears the completion date of 1303, but contains cross-references to Peter's commentary on the Problems of Aristotle which was not completed until 1310. See Thorndike, History of Magic, II, 880, for discussion of this point.

137. Peter's will was first printed as an Appendix to C. Ronzoni, "Della vita e della opere di Pietro d'Abano," Atti della R. Accademia dei Lincei, Series 3, Memorie, Classe di Scienze Morali, Storiche, Filologiche, II (1877-1878), 548-550. It is also printed in Gloria, Monumenti, 1222-1318, documents, p. 78, and is described in detail in Thorndike, History of Magic, II, 939 ff.

F-II-31

138. Michele Savonarola, writing about 1445, singles out Peter's skill as a "Parisian philosopher" for special praise: "Hic Parisius philosophus summus habitus est. . . ." M. Savonarola, Libellus de magnificia ornamentis regiae civitatibus Padue, Muratori, RIS, XXIV, part 15 (Città di Castello: S. Lapi, 1902), 27.

139. For Peter's interests in the area of natural science and natural philosophy, see Chapter IV below.

140. "Secundum Aristotilis verbum in libro Posteriorum qui dicit omne quod facit cibum non eminare in stomaco est sanum, sed deambulacio post cenam facit cibum non eminare igitur deambulacio post cenam est sanum." A note on the same page identifies the quotation as from Aristotle, Posterior Analytics, 2.11 (Rolandino, Cronica, 11.14, p. 154).

141. This term was sometimes used to mean medicine alone (e.g., by Boncompagno, Rhetorica Novissima, 5.9, p. 270), but undoubtedly also had a wider application. See Chapter IV below, passim.

142. The "old" logic consisted of those of the logical works of Aristotle that were known before the mid-twelfth century, namely, the Liber praedicamentorum, De interpretatione, and the Isagoge of Porphyry, all in the translation of Boethius. The "new" logic comprised the Aristotelian logical works rediscovered in the mid-twelfth century, namely the Analytica priora, the Analytica posteriora, the Topica and De elenchis sophisticis.

F-II-32

143. Mostra dell'Aristotelismo e Averroismo in Veneto, Catalogo di mostra . . . in occasione del XII Congresso Internazionale di Filosofia (Padua and Venice, September, 1958) (Venice: Biblioteca Nazionale Marciana, 1958), p. 38, No. 62; Padua, Biblioteca Universitaria, cod. 783 Topica (trans. Boethius), 13c. From S. Maria di Praglia, Padua, property of the monks of Santa Giustina.

144. Bodleian Library, Oxford, Canon. Misc. 403, sec. xiv ineuntis, Robert Kilwardby super Porphyri Isagogen, Praedicamentorum, de Interpretatione, Posteriorum, Priorum, Topicorum, Sophisticorum Elenchorum. At fol. 255, "Scriptum super toto testu logicae Aristotelis, scilicet super tota arte veteri et nove scriptum, captum ducatis tribus cum dimidio Paduae . . . eximius artium et medicine doctor Johannes M . . ch . . nna (Marchanova) . . . 1467." H. O. Coxe, Catalogi codicum manuscriptorum Bibliothecae Bodleianae, Pars. 3, Codices graecos et latinos Canonicianos complectens (Oxford, 1854), cols. 741-742. The English Dominican Robert Kilwardby (d. 1279) taught at Paris in the middle of the thirteenth century.

145. Weiss, Il primo secolo, p. 34. Numerous citations from the libri naturales of Aristotle are also given by Geremia da Montagnone. See below, pp. 208=209.

146. On the life and writings of Aegidius Romanus see Histoire Littéraire de France. Ouvrage commencé par des Religieux Bénédictins de la Congregation de Saint Maur et continué par les membres de l'Institut,

XXX (Paris, 1888, hereafter cited as Histoire littéraire), Part 2, 421-566, and P. Mandonnet, "La carrière scolaire de Gilles de Rome," Revue des sciences philosophiques et théologiques, IV (1910), 480-499, and below, p. 210. Aegidius commented on nearly all the known works of Aristotle.

147. Histoire Littéraire, XXX, 443-445.

148. Ibid., p. 430, where a French translation of the document in question is printed.

149. P. Glorieux, La littérature quodlibétique de 1260 à 1320 (3 vols., Le Saulchoir Kain, Belgium, 1925), II, 25, and below.

150. The value and significance of late medieval formal logic has only recently been realized. Ph. Boehner, Medieval Logic (Manchester: Manchester University Press, 1952), provides a useful summary of recent research. Other works in this area are Ernest A. Moody, Truth and Consequences in Medieval Logic, Studies in Logic and the Foundation of Mathematics (Amsterdam: North Holland Publishing Company, 1953) and J. P. Mullaly, ed. and trans. Peter of Spain: Tractatus syncategorematus (Milwaukee, Marquette University Press, 1964).

151. Gloria, Monumenti 1222-1318, pp. 243-247.

152. "Ipse [sc. reverendus pater et dominus meus Richardus de

F-II-34

Malumbra] enim irridebat aliquos doctores contemporaneos suos qui studebant tradere scientiam nostram modo sillogistico, sophistico et dialectico modo. Et dicebat considerari debere quod scientia nostra tradi non debet hoc modo . . . quomodo arguunt doctores moderni et discipulos instruunt et quod originem habuit a doctoribus ultramontanis, qui in multis plus eorum aliqui fuerunt subtiles quam utiles." (Prima Alberici super Digesto Veteri. Commentariorum iuris utriusque summarii Domini Alberici de Rosate [Leyden: 1545; I have consulted the copy in the Columbia University Law Library], proemium, fol. 2r.) The passage is alluded to in E. M. Meijers, "De Universiteit van Orleans in XIII^e Eeuw," Tijdschrift voor Rechtsgeschiedenis, II (1920-1921), 460-518, at pp. 492-493.

153. Gloria, Monumenti, 1222-1318, pp. 334-337.

154. Colle, Storia scientifico-letteraria, IV, 21.

155. "Scholares autem moderni magis delectantur audire subtilia et sillogistica quam utilia: et doctores in his applaudunt quod facere non deberent" (Prima Alberici super Digesta Veteri, proemium, fol. 2r.).

156. Thomas Bradwardine, at Merton in the 1320s, composed the Tractatus de Proportionibus in 1328. (See H. Lamar Crosby, Jr., Thomas of Bradwardine, His Tractatus de Proportionibus [Madison: University of Wisconsin Press, 1955]). William of Heytesbury wrote Regule solvendi sophismata in 1335. (See Curtis Wilson, William Heytesbury: Medieval Logic and the Rise of Mathematical Physics [Madison: University of Wisconsin Press, 1956]). John Dumbleton, at Merton in the 1330s and

F-II-35

1340s was the author of a Summa de logicis et naturalibus, which does not appear to have been printed in its entirety (see TK 725). Richard Swineshead or Suiseth was at Merton in the 1340s and 1350s and is principally remembered for his Liber calculationum, printed in several early editions (see TK 721, 1030). Jean Buridan, who was at the University of Paris during the years 1328-1358, wrote Consequentiae and Sophismata both printed in incunabula editions. For an account of Buridan's life and writings see Histoire Littéraire, XXXVII (1949), 462-605.

These writers and their works are discussed and texts are printed in M. Clagett, The Science of Mechanics in the Middle Ages (Madison: University of Wisconsin Press, 1959). However, as the title of this work indicates, the selection of texts from the Oxford doctors was not primarily oriented towards logic. A helpful brief survey of the development of medieval logic in the thirteenth and fourteenth centuries is contained in the introduction to Ernest A. Moody, Truth and Consequence in Medieval Logic, Studies in Logic and the Foundations of Mathematics (Amsterdam: North-Holland Publishing Company, 1953).

157. Several fourteenth century manuscripts of Heytesbury's works are contained in the Biblioteca Universitaria and the Biblioteca Antoniana, Padua (Wilson, Heytesbury, p. 207); an inventory of the books of a medical student, Benedetto Greco di Salerno, made June 13, 1401, includes "una Loyce Johannis Budani . . . Summa Dulmentonis. . . . Calculationes Suscepe Anglici. . . ." (Gloria, Monumenti, 1318-1405,

P-II-36

II, 385). Petrarch (d. 1374) wrote of the barbarity of the new English logic (Ep. de rebus familiaribus, 1.54, cited in G. B. Parks, The English Traveller to Italy (Stanford: Stanford University Press, 1952), I, 453.

158. Extracts, with a translation, are printed in Clagett, Mechanics, pp. 495-503. Professor Clagett plans an edition of the complete questio (letter to the writer dated November 12, 1969). This questio, which is concerned with the physical laws of motion is further discussed below, pp. 235-236.

CHAPTER III

ARITHMETIC, GEOMETRY, MUSIC, AND ASTRONOMY

Although for the sake of convenience the arts of the quadrivium must be discussed separately and in series, such a separation probably gives a distorted idea of their treatment in the schools of Padua and other medieval centers of learning. The four mathematical arts were intimately associated as regards subject matter: some grasp of arithmetic and geometry was a necessary basis for the study of astronomy, and the "music" taught in the schools of arts largely concerned the mathematical proportions related to harmony.¹ In addition, arithmetic, geometry and music, and in some instances also astronomy appear to have been taught by the same doctors. One may give as instances, John of Sacrobosco, author of the standard elementary texts on arithmetic and astronomy, who taught at Paris in the thirteenth century,² and Prosdocimo de' Beldomandi, who lectured at Padua in the early fifteenth century and wrote on music, astronomy and mathematics.³

While most of the surviving evidence concerning the quadrivial arts at Padua dates from after the beginning of the fourteenth century, there is a strong probability that all four arts were taught there at an earlier date, as was true at Paris.⁴ However, although a number of recent studies have been devoted to the mathematical arts at Paris and Oxford,⁵ there appears to be no comparable

work on the quadrivium in the Italian university centers in the thirteenth and early fourteenth centuries.

The existing evidence concerning the Italian schools tends to show that the ancient tradition that linked the liberal arts with medicine was a living reality, even before the formation of colleges or universities of arts and medicine under that name. For example, Boncompagno of Florence, who taught at Bologna and probably at Padua, included a description of what he termed phisica, that is, medicine, along with descriptions of the seven liberal arts in his Rhetorica Novissima, completed in 1235.⁶ Rolandino, listing the regent masters of arts at Padua in 1262, included three doctors of phisica et sciencia naturalis.⁷

The link between the arts and medicine was especially strong as regards the quadrivium, because the study of astrology formed an essential part of medical training throughout the Middle Ages. Consequently, there appears to have been a tendency at both Padua and Bologna in the given period to subordinate arithmetic and geometry to astrology. For example, at Bologna in 1405 the student university of arts and medicine named texts for courses in philosophy, medicine and astrology. The books required for "astrology"⁸ included both mathematical and astronomical works, a number of them dating from the thirteenth century or earlier. Among these were the Algorismus de minutis et integris (that is, probably, the Algorithmus Demonstratus)⁹; the Sphera, presumably of Sacrobosco, the Theorica Planetarum, Euclid with the commentary of Campanus, and the Alfonsine Tables.¹⁰ Most of the works named had, in all

likelihood, long been standard texts at Bologna when the statutes in question were compiled, and it is highly probable that they were similarly used at Padua.

In the following discussion of the quadrivium at Padua before 1350, the four mathematical arts will be treated in the order arithmetic, geometry, music, and astrology, a variant of the Nichomachean sequence adopted by St. Thomas Aquinas, which has been chosen here to emphasize the position of astrology.¹¹

Although there appear to be no arithmetical texts of Paduan authorship or records of lectures in arithmetic at Padua in the period before 1350, there are reasons for supposing that instruction in arithmetic was given from at least the middle of the thirteenth century. In the first place, there is direct evidence for the study of astrology at Padua before 1250,¹² and some arithmetical and geometrical calculations are necessarily involved in any attempt to record the apparent positions of the stars on a regular basis. Second, there is the parallel with Bologna, where, as just noted, a thirteenth century arithmetical text, the Algorithmus demonstratus, apparently formed part of the curriculum. But it appears that the earliest direct evidence of arithmetical study at Padua is to be gleaned from the writings of Peter of Abano, and thus relates to the first decade of the fourteenth century.¹³ It is possible, however, that the rather limited range of ideas and authorities referred to by Peter may not represent the sum total of mathematical instruction at Padua in the decade that he taught there. Peter's mathematics was chiefly derived from the speculative arithmetic of the Greeks, as

transmitted by Boethius,¹⁴ and his treatment of mathematical questions was neither very lengthy¹⁵ nor, perhaps, very profound.

Peter of Abano considered the various branches of mathematics to include "problems of great difficulty."¹⁶ He contrasted the role of the mathematician, who proceeds by inductive reasoning with that of the natural scientist, who describes natural bodies. The dimensions of plants and animals, for example, he held could be considered from either a mathematical or a physical point of view.¹⁷ The account of the history of mathematics that he incorporated into the Expositio Problematum Aristotelis follows that of Isidore of Seville. The science is said to have been invented by Pythagoras and developed by Apuleius.¹⁸ Peter divided mathematics into two kinds: "one simple, as arithmetic and geometry; the other relative, namely music and harmony."¹⁹ In several places in the Conciliator, however, he linked music and arithmetic together; for example, Peter remarked that degree in medicine is different from degree in arithmetic and music, and that proofs should not be taken over from one subject to another.²⁰

Arithmetic Peter believed to be an essential study for physicians, explaining that it was necessary to be able to manipulate fractions in order to calculate the critical days of illness.²¹ His main arithmetical interest seems to have been in the qualities of different numbers. He noted in the Expositio Problematum Aristotelis that the Pythagoreans reduced everything in the universe to number, and that the Platonists followed them to some extent as regards the soul.²² Peter himself was somewhat inclined to number mysticism, but

was not completely bound thereby. His commentary on the question "Why do all men, Greeks and barbarians alike, count in tens," includes a lengthy proof that ten is a perfect number, a proof so involved and abstruse that it took him four years to work it out. His final conclusion, however, is that counting in tens is natural because men have ten fingers.²³ In the Conciliator he devoted considerable space, in a discussion of the belief that infants born in the seventh month of pregnancy have a better chance of survival than those born in the eighth, to the concept of seven and nine as perfect numbers, citing Alexander, Pythagoras and Macrobius. Nine is an especially desirable number, according to Peter, because it corresponds to the number of the celestial spheres, but all odd numbers are superior and are preferred by mathematicians to even numbers. In the same differentia Peter explained the process of cubing numbers.²⁴

Although, as already noted, Peter of Abano relied mainly upon the arithmetic of Boethius, he was also familiar with at least one more recent mathematical writer, namely Jordanus Nemorarius, whom he cited in connection with the problem of counting in tens referred to above.²⁵ As far as has been ascertained, Peter did not cite the Algorismus Prosaius of Sacrobosco, one of the most popular and widely used mathematical texts in universities in northern Europe in the later thirteenth and fourteenth centuries, nor the work of Al-Kwarizmi on which it was based.²⁶ It is less surprising that Peter of Abano apparently did not mention the leading Italian mathematician of the thirteenth century, Leonardo Fibonacci of Pisa,²⁷ since, according to Abelson, even the writings of Prosdocimo de' Beldomandi, who lectured

III-6

on mathematics at Padua after 1422, do not show any knowledge of Leonardo's work.²⁸

If the writings of Peter of Abano are any criterion, Boethius probably remained the principal text for students of arithmetic at Padua throughout the period under consideration. The possibility that more recent works incorporating the Hindu-Arabic system of numerals were not widely used by Paduan students is suggested by the requirement in the statutes of the jurist universities of Padua compiled in 1331 that stationers should prominently display a price list in "clear letters, not cyphers."²⁹ It is equally possible, however, that the statutes were merely repeating a traditional requirement which, by the fourth decade of the fourteenth century, no longer reflected the actual state of knowledge of Hindu-Arabic numerals among students. Of course, if Peter of Abano's occasional citations of Jordanus Nemorarius can be taken as evidence that the Algorithmus Demonstratus was in general use in the schools of Padua, there can be no doubt that this system of notation and its mathematical advantages were thoroughly understood.

The second mathematical art, geometry, was certainly known to at least one scholar who studied at Padua in the thirteenth century, namely Witelo,³⁰ author of the celebrated treatise on optics generally known as the Perspectiva.³¹ Witelo, a Pole, was at Padua between 1262 and about 1268.³² Although he apparently came there to study canon law,³³ his principal surviving works suggest that his interests centered mainly upon natural science

and metaphysics.³⁴ By at latest 1269 he was on close terms of friendship³⁵ with William of Moerbeke, the prolific and learned translator of Aristotelian and numerous other scientific works from Greek.³⁶ It may have been at Witelo's suggestion that William undertook the translation of mathematical and physical works by Archimedes in 1269.³⁷ Witelo, in turn, dedicated his own principal work to William.³⁸

Although it is well known that Witelo's Perspectiva is largely based on the treatise on optics by Alhazen, Witelo's own contribution to the work is not negligible. For example, it is of significance that he reorganized the material at his disposal in order to emphasize the fact that geometrical knowledge was required for the study of optics. The first two books of the Perspectiva, which have no direct parallel, as far as organization is concerned, in Alhazen, consist solely of the geometrical theorems Witelo considered fundamental to optics; the theorems are illustrated with diagrams and, in each case, their sources named.³⁹ In most cases the source cited is Euclid (up to the eleventh book),⁴⁰ but Witelo also made use of the recently written commentary on Euclid by Campanus of Novara (d. after 1292),⁴¹ the Liber conicorum of Apollonius,⁴² the Liber cylindricorum of Serenus,⁴³ and the commentary of Eutocius on the *De Sphaera et cylindro* of Archimedes.⁴⁴

The last three works named probably became known to Witelo as a result of his friendship with William of Moerbeke, the translator of Eutocius, and were therefore not necessarily available to him during his stay at Padua. Nonetheless, Witelo could not have

profited from his association with William as he did without a sound previous grounding in mathematics and especially geometry. By the time Witelo went to Padua several translations of the Elements of Euclid had long been available in the west, notably those by Adelard of Bath (1120) and Gerard of Cremona (1188).⁴⁵ There seems little reason to doubt that Euclid was already known to Witelo at Padua in the 1260s, especially since he had previously studied arts in Paris,⁴⁶ where Euclid was certainly part of the curriculum.⁴⁷

The knowledge of geometry displayed in the Perspectiva of Witelo is not paralleled in the works of any other doctor known to have studied or taught at Padua before Biagio Pelacani of Parma, who began to teach at Padua in the 1380s.⁴⁸ The precise nature of Witelo's position and the extent of his influence at Padua is, however, hard to determine. As Dr. A. Birkenmajer pointed out, the facts that Witelo had already studied arts at Paris and that he produced a mature work very shortly after leaving Padua, make it unlikely that he was a student in the Padua faculty of arts, a supposition that is confirmed by the statement in the explicit of the Paris manuscript of "De natura demonorum" that Witelo was a student of canon law.⁴⁹ But even if Witelo came to Padua to study canon law, the possibility that he may simultaneously have lectured in the faculty of arts is not necessarily precluded. If so, he does not appear to have established any tradition of advanced mathematical study in the schools of Padua; no students of his are known and little or no

attention seems to have been paid to the mathematical aspects of his work by Paduan writers.⁵⁰

There are various references to geometry in the principal works of Peter of Abano, but the subject is nowhere discussed in any great detail by him. Geometry is the topic of a number of problems in the Expositio Problematum Aristotelis,⁵¹ but Peter's exposition lacks any attempt at rigid demonstration and, so far as the present writer has been able to ascertain, any reference to Euclid. In the Conciliator, however, a citation of the ninth book of Euclid indicates that Peter probably knew the whole of the Elements.⁵² A few geometrical definitions, among them those of a magnitude and a line are given.⁵³ The definition of a line, "among the mathematicians the continuation of an imaginary point produces a line," apparently comes from Aristotle.⁵⁴ The problems resolved include such questions as why the paths of a cylinder and a cone differ when they are propelled across a flat surface,⁵⁵ and why the parts of plants and animals--trunks, branches, limbs, etc.--are generally more or less circular in section.⁵⁶ Peter's answer to the latter question is that circular forms reflect the perfection of the heavens.

In the Conciliator, little attention is paid to geometry. Defined as "the science of measuring magnitudes," it is stated to be necessary for the physician because he must know how to define the shape of wounds, since differently shaped wounds heal differently, "for round wounds are slower and more difficult to heal."⁵⁷ Elsewhere in the Conciliator, as

III-10

Professor Thorndike noted, Peter deliberately avoided introducing geometrical notions into a discussion of optics with the remark, "The arguments taken from the books of geometricians and students of perspective such as Euclid, Alhazen and others, and marked out by letters of the alphabet [probably a reference to Witelo's Perspectiva], I omit, because most of those for whom I am writing are unfamiliar with that sort of thing."⁵⁸

There is unfortunately no way of telling whether it was an audience of Paduan or of Parisian scholars that Peter envisaged as more or less ignorant of Euclid some fifty years after Witelo wrote. It may be worth noting in this connection that only a few pages after the statement just quoted, Peter wrote that he had heard that the region of the North Pole was still inhabited by cannibals "from men worthy of credence in Perugia," and had heard a similar story about evil spirits in Norway "in France."⁵⁹ Such a choice of wording certainly seems to imply that the author was in Italy at the time of writing.

Be that as it may, complete ignorance of Euclid would in any case appear highly unlikely among scholars in Italy by the first decade of the fourteenth century. As already noted, two Latin translations of the complete text of the Elements had been available since the twelfth century.⁶⁰ The commentary on Euclid by Campanus of Novara, which was used by Witelo before 1276, survives in a number of manuscripts,⁶¹ and served as a school text; at Bologna the first three books of Euclid together with the commentary of Campanus were required reading by 1405.⁶² Moreover, a fourteenth century manuscript at the Biblioteca Universitaria

III-11

in Padua contains Adelard of Bath's translation of Euclid, together with a treatise on the quadrant often ascribed to Robertus Anglicus and various questions.⁶³ Such a manuscript, combining the chief theoretical authority on geometry with a practical work on the use of a geometrical/astronomical instrument, would certainly appear to have been compiled to meet the needs of arts students or teachers. It may also be noted at this point that the musical author Marchetus of Padua, and his collaborator Syphante de Ferrara, who may have been educated at Padua, displayed some slight knowledge of geometry when writing in the 1320s.⁶⁴

It is possible therefore that Peter of Abano's low estimate of the geometrical knowledge of his readers was merely a reflection of his perhaps unjustifiably low opinion of Italian students, expressed in the remark: "The youth of France appear wise from the beginning and are infatuated with the desire continuously to augment their knowledge. The youth of Italy are, however, quite otherwise."⁶⁵

On the other hand, there is a well-known anecdote about Biagio Pelacani da Parma, who taught at Padua in the mid-1380s and again in 1407-11,⁶⁶ which, if it has any basis in fact, suggests that the serious study of geometry may have been something of a novelty at Padua late in the fourteenth century. According to this story the humanist Vittorino da Feltre (1378-1446) was as a young man very anxious to learn geometry. Biagio, the only doctor capable of expounding Euclid, refused to lower his high fee for the impoverished youth, who then performed the feat of mastering the Elements without a teacher.⁶⁷ This story is found

III-12

in an early life of Vittorino da Feltre, but as Professor Thorndike pointed out, the dates involved suggest that it is unlikely to be true.⁶⁸ Indeed, it seems highly improbable that at such a late date the exposition of Euclid in itself could have been a high priced novelty. It is possible, of course, that Biagio's exposition was considered more profound and skilled than that of earlier doctors, and that at Padua from the departure of Witelo until the arrival of Biagio, the study of geometry was limited and superficial. Renewed interest in the subject perhaps coincided with the emergence of mathematics as an autonomous discipline in the period between about 1380 and 1420.⁶⁹

Turning to the topic of music, one finds little information concerning this subject at Padua in the thirteenth century. Considerably more evidence is available for the first half of the fourteenth century, when Padua appears to have developed as a musical center of some importance and to have played a major role in the diffusion in Italy of the so-called ars nova.⁷⁰ The names of both composers and theorists of the ars nova are associated with the city or with the courts of the Carrarese and the della Scala: the Lucidarium⁷¹ and Pomerium⁷² of Marchetus of Padua, who was working in the 1320s,⁷³ expound current methods of musical mensuration and notation, while the De rhythmis vulgaribus of Antonio da Tempo of Padua, dedicated in 1332 to Alberto della Scala, a notable patron of music who was present in Padua when the city was ruled by Can Grande della Scala between 1328 and 1337, describes the new polyphonic, secular madrigals.⁷⁴ In addition, two of the earliest

composers of the Trecento school in Italy are Bartolino of Padua and Grazioso of Padua.⁷⁵ The oldest known surviving fragment of the music of the Italian ars nova is said to contain lyrics in the Paduan dialect, and a recent scholar has suggested that it may represent music sung at Padua in the entourage of Alberto della Scala. The notation in this manuscript, the same author has further pointed out, is similar to that described by Marchetus of Padua.⁷⁶

That all this innovative musical activity, much of which took place in a courtly ambiance, was carried on side by side with some academic study of traditional musical theory in the faculty of arts at Padua is not in doubt. The principal evidence for the academic study of music comes, once again, from the writings of Peter of Abano. In both the Conciliator and the Expositio Problematum Aristotelis music receives rather extended discussion,⁷⁷ and is perhaps more emphasized than either arithmetic or geometry, probably because of the antiquity and respectability of the association of music and medicine. Music therapy was discussed by Hippocrates and Galen⁷⁸ and Isidore of Seville had pointed to the effect of David's harp-playing upon King Saul as a scriptural example of the healing power of music.⁷⁹

Peter of Abano himself considered the acquisition of a knowledge of musical theory to be an essential part of the education of a physician.⁸⁰ He based this belief, however, less upon generalities about the healing power of music, than upon the ancient idea that the pulse beats in musical rhythm.⁸¹ He repeated

from Boethius the definition of the three types of music: the music of the spheres; musica humana, a harmony created by the relationship of soul and body, and instrumental music, that is audible music created by human voices or by instruments.³⁶ The relationship between music and medicine, Peter observed, is primarily in terms of musica humana of which the rhythm of the pulse was an external manifestation.³⁷ The laws of musica humana are evidently identical if not identical with those of the ordinary music to be heard in this world, since, in a discussion of pulse, he found it necessary to supply his readers with a fairly detailed and concise summary of musical theory. His account is taken mainly from Boethius, although he also cited Guido of Arezzo.³⁸

In discussing music and pulse,³⁹ Peter of Aversa first noted the objections to the association of these topics, namely, (i) that music and medicine are different in kind and can have nothing in common, since music deals with quantities, and is considered part of mathematics, while medicine is natural and deals with qualities, and (ii) that according to Boethius, music is associated with morality, while medicine has no such connection. Music is then defined as the science of skillful modulation, which involves both sense and reason. The statement that consonance in music requires mathematical proportion introduces a lengthy exposition apparently mostly drawn from Boethius, in which Peter first defined the different types of proportion and then discussed the applicability of some of them to music. There are said to be five types of simple and two of composite proportion, ranging from the simple

multiplex, referring to multiples of whole numbers, to multiplex superpartiens, a term used when one number is to another in the proportion of two and more than one fraction to one; for instance 8:3 is the equivalent of $2\frac{2}{3}:1$, and constitutes a variety of multiplex superpartiens known as duplex superbipartiens. In music, only the three simple proportions sexquitercia ($1\frac{1}{3}:1$, as 4:3), sexquialtera ($1\frac{1}{2}:1$, as 3:2), and sexquioctava ($1\frac{1}{8}:1$, as 9:8) are used. Musically they are termed epitrica (4:3), emiola (3:2) and epogda (9:8). Ptolemy is said to be alone among authorities in considering 5:3 (superbipartiens) a musical proportion. The proportions just named are then related to the various musical intervals known as diapente, diatesseron and diesis. Despite his declaration that only 4:3, 3:2, and 9:8 are admissible proportions in music, Peter of Abano apparently also allowed proportions of 4:2 and 3:1, since he also stated "Double is when a larger number contains a smaller one, as 4:2. From which diapason is produced . . . Triple is when a larger number contains a smaller one three times . . . from which is produced a composite simphonia called diapente diapason".⁸⁶

Peter also discussed semitones and the scale, remarking that the moderns denoted the notes of the scale by a Greek gamma followed by seven letters of the Latin alphabet, whereas Boethius and other ancient authorities do not use the gamma. He repeated the story of the invention of the monochord by Pythagoras in order to teach musical relationships and proportions and supplied brief descriptions of other stringed instruments, some of which, such as

the rubeba and the viola, were, as G. Vecchi⁸⁷ has pointed out, those used in Peter's own day. Finally, there is a short account of the Greek diatonic, chromatic, and enharmonic tetrachords and a list of the Greek names of the notes.

The remainder of the differentia is devoted to the refutation of those who hold that musical consonance has nothing to do with pulse, or that if there is a connection, its nature is not accessible to human understanding. While strongly maintaining, in company with Galen and Aristotle, that there was a connection between musical rhythm and pulse, Peter admitted that "the science of pulse is hard and difficult, and knowledge of it is come by with great difficulty."⁸⁸

The sections on music in the Expositio Problematum Aristotelis do not add a great deal to the account of this topic in the Conciliator, at any rate as far as musical theory is concerned. In the introduction to Particula 19, "On Harmony," Peter gave a brief account of the origin of music, which is said by the poets to have begun with Jove's daughter, Nemone, and in the Bible to be the invention of Tubal[sic] Cain, but which Boethius and Macrobius refer to Pythagoras. There follows a definition of the three types of music in much the same terms as in the Conciliator.⁸⁹ Also noted is a distinction between rhythm, a succession of pleasing sounds, and meter, a formal division into feet.⁹⁰ Accounts of the monochord, the Greek scales,⁹¹ and of musical proportion⁹² follow at considerable length. The discussion is less strictly confined to theoretical matters than in the Conciliator; references occur to the pleasure given by sung narratives, which combine

melody and a story,⁹³ and to the different ways in which tragedy and comedy should be sung. Since comedy deals with private and humble people, it should be rendered like an ordinary vulgar song dealing with vulgar matters, and performed in a way like ordinary everyday speech. But tragedy is a genuine mode of singing.⁹⁴ There are also allusions to the poetic meters of Virgil and Ovid, and to metrical rules which must be followed even by grammarians, if they wish to construct a perfect oration; the French are said to be particularly skilled in the use of these rules.⁹⁵ Other topics touched on include the question why it is more difficult to sing high notes than low ones⁹⁶ and the power of music over animals.⁹⁷

By way of summary, it may be stated that the works of Peter of Abano display a fairly thorough knowledge of traditional musical theory.⁹⁸ His treatment of the topic is almost entirely academic and relies mostly upon classical authorities, the only medieval authors cited being Isidore of Seville and Guido of Arezzo. Peter was, however, cognizant of contemporary musical instruments and types of performance and apparently did not disapprove even of popular secular music.⁹⁹

Of considerably greater musicological significance than Peter of Abano's writings on music are the two treatises of Marchetus of Padua, the Lucidarium and the Pomerium.¹⁰⁰ Almost nothing is known of the biography of Marchetus and only his name associates him definitely with Padua.¹⁰¹ His works, both of which are dedicated to secular rulers,¹⁰² may have served most frequently

as a guide for professional musicians associated either with courts or with the church. There are, however, as the following discussion will show, some indications to link Marchetus and his treatises with Padua, and to suggest that the Lucidarium and the Pomerium may have on occasion been studied in academic circles, and that such use was in accordance with their author's intention.

Considerable confusion over the place of Marchetus in the history of music has been caused by the fact that the manuscript of the Lucidarium printed by Martin Gerbert bears the date 1274.¹⁰³ This date, questioned by Gerbert in the eighteenth century,¹⁰⁴ has definitely been shown to be erroneous by more recent scholars. It has been pointed out that the work is said in its preface to have been commissioned by Raynerius de Zaccaria de Urbeveteri, representative of the King of Naples in the Romagna, a position filled by Raynerius between the years 1310 and 1318.¹⁰⁵ Dr. O. Strunk believes that the possible dates for the composition of the treatise can be narrowed down to the years 1317-1318.¹⁰⁶ The Pomerium was probably written quite soon after the Lucidarium since the two works were planned together.¹⁰⁷ The second treatise is stated in its explicit to have been written at Cesena in the house of Raynaldus da Cintris, that is the same Rinaldo dei Cenci who was the patron of Giovanni del Virgilio.¹⁰⁸ Rinaldo's links with Padua and Paduan cultural life have already been alluded to, and it is possible that he invited Marchetus to come from Padua to form part of the small courtly circle at Cesena.¹⁰⁹ The Pomerium must therefore,

as Dr. Strunk has shown, date from before Raynaldus' fall from power in Cesena in 1326.¹¹⁰ It was probably written before 1324 because Marchetus does not use the title Cavaliere received by Raynaldus da Cintris in that year,¹¹¹ and because Giovanni del Virgilio, who came to Cesena in 1324, makes no mention of Marchetus.¹¹² Almost the only other information about Marchetus' career that can be gleaned from his works is the possibility that he may have been a religious. Both the Lucidarium and the Pomerium were written in close collaboration with a brother Syphante de Ferrara of the Order of Preachers,¹¹³ and at one point in the Pomerium Marchetus envisages his readers addressing him, the writer, as "Brother."¹¹⁴ Marchetus is termed "magister" in the explicit of the Pomerium¹¹⁵ and "doctoris musicae" in the proemium of a manuscript of a treatise entitled Liber Ligaturarum which is based on his work.¹¹⁶

Taken together, the Lucidarium and the Pomerium provide a comprehensive account of musical theory, drawn both from traditional authorities and also from the actual practice of Marchetus' own day. The Lucidarium is a general treatise concerning musica plana, which is defined as "any melody (cantus) which is written and sung without measurement of time and limitation of notes."¹¹⁷ The Pomerium deals with musica mensurata which is "any melody measured by time intervals whose written notes (figurae) are all limited by name, type of symbol (figura) and essence of quantity."¹¹⁸ Most of the innovations recorded by Marchetus are, naturally, contained in the Pomerium, since the introduction of

limited time intervals and new systems of notation constitute some of the principal theoretical innovations of the ars nova.

Marchetus intended his works to be of use to those interested in music from both the theoretical and the practical standpoint. The preface, or dedicatory letter, of the Lucidarium states that the work will be one from which "musicians (musicī) and performers (cantores) can have rational understanding in the plana musica that they play."¹¹⁹ "Musicī" Marchetus defined, following Boethius,¹²⁰ as those who "know the virtue and reason of musical proportions and judge according to this and not by sense alone,"¹²¹ whereas cantores are simply performers. The Pomerium Marchetus claimed to have written in order to show musicis et cantoribus that mensurated music is not the product of uncontrolled will, but of a rational order, and that it is a legitimate subdivision of the science of music.¹²²

Probably in order to make his works more acceptable in learned circles, Marchetus called upon the assistance of Brother Syphante of Ferrara to supply "philosophical reasons" for inclusion in both the Lucidarium and the Pomerium.¹²³ There is no way of determining the precise extent of Brother Syphante's contribution, but it was presumably fairly considerable, since he receives acknowledgement in the dedicatory letters prefacing both treatises and also at the conclusion of the Pomerium.¹²⁴ The contents of the works bear out this inference, since references both to ancient writers on music and, in the Pomerium, to Aristotle are fairly numerous.

Whatever may have been the respective contribution of the two authors it is, in any case, obvious that an effort has been made to present the works in scholarly guise. The Lucidarium, for example, opens with an account of the origins of music, which is said, on the authority of Macrobius, to have been invented by Pythagoras.¹²⁵

A chapter "On the Usefulness of Music", contains references to Isidore of Seville in connection with the story of David and Saul and to the relationship of music and pulse.¹²⁶ In the following chapter, "On the Judgment of Music", it is stated that music is not to be judged by sense only but also by mathematical reason (ratio numerorum), which rules like a mistress.¹²⁷ Music itself is defined as both an art and a science consisting in numerical proportions and measured quantities, conjunctions and consonances.¹²⁸ Two lengthy sections on musical proportion define the various mathematical proportions also explained by Peter of Abano.¹²⁹ Marchetus carried his exposition to the point of defining sesquidecimasextima ($a = b + \frac{1}{17}$, or 18:17).¹³⁰ The ancient terms diapason, diapente, diatesseron and so on are also explained at length in the first of these sections, and a passage on "the names of the tones according to writers on music", gives the Greek derivation of such words as epogdoun and diastema.¹³¹ Marchetus, like Peter of Abano, referred to the practice of using a Greek gamma for the opening letter of the scale, and declared that this was done in honor of the first doctors and phisici of music, who were all Greek.¹³² The place of music among the quadrivial arts is emphasized in a passage in which music is said to deal with

a mobile and impermanent subject; it is compared with astrology, the subject of which is mobile but permanent; and with geometry, the subject of which is immobile but not permanent, "namely the earth"; it resembles arithmetic in that it treats of numerical proportion.¹³³ Citations of Ptolemy, Macrobius, Augustine and Boethius are scattered throughout the Lucidarium, but Marchetus also refers with fair frequency to such medieval writers as Isidore of Seville, Remigius of Auxerre,¹³⁴ Guido of Arezzo and Hucbald of St. Amand.¹³⁵

Enough has perhaps been said to illustrate the proposition that the Lucidarium of Marchetus of Padua is presented in a fairly scholarly framework. It should be emphasized, however, that the work is primarily a description of contemporary practice; it includes a series of musical examples,¹³⁶ a section on polyphony (de coniunctionibus vocum),¹³⁷ and lengthy chapters on the division of whole tones into fifths, which were later severely criticized by Prosdocimo dei Beldondani on the grounds of their departure from classical tradition.¹³⁸

Turning to the Pomerium, the reader finds an even more ambitious attempt to present the work in scholarly dress, since Aristotle is cited more frequently than any other authority, including the chief musical authority referred to, namely the thirteenth century innovator Franco of Cologne.¹³⁹ Possibly Marchetus and his collaborator thought that the greater novelty of the subject matter, mensurated music, made the support of the Philosopher imperative if the work were to gain acceptance. For

the Pomerium, which is now generally supposed to be an account of current practice in Italy rather than of original theories evolved by Marchetus, describes a complex and detailed system of musical notation, capable of a much more exact rendition of musical sound than that previously in use.¹⁴⁰

Early in the Pomerium the authors declared their intention to proceed in a scientific manner, imitating the method of philosophy.¹⁴¹ They were careful to point out that both notes and time measurement are proper concerns of music considered as a science. "For science does not concern accidents, but only things pertaining to the essentials and intrinsic aspects of the particular science in question; but notes constitute the substance of music, and the science of music essentially consists of notes."¹⁴² Again, "Music is a science, and the consideration of the measurement of perfect time is pertinent to it, and it is an intellectual concern; and the intellect is separated from matter and, by way of consequence, so is a science and whatever pertains to it."¹⁴³ Time measurement should therefore be treated as an abstract question and disassociated from the ability of particular singers. The statement of Aristotle that "the first thing that is in every kind of species is measure and that thing is perfect by which all things of that species are measured," is put forward as an endorsement of the new science of mensurated music.¹⁴⁴

Elsewhere it is pointed out that the new system demands exactness on the part of the copyist, and Aristotle is called on to reinforce the demand.¹⁴⁵ The concluding portion of this passage

III-24

suggests that one of the authors, presumably Syphante de Ferrara, in addition to having studied arts, may have also had some medical training, perhaps at Padua. The author proceeds to prove the superiority of the right over the left side, with allusions to the opinions of both philosophers and medici. The medici say that the right side is more perfect because the liver (? "epax") which affects the blood is on the right; the philosophers, however, attribute this superiority to the fact that, although the heart, which is the source of life and of all movement of the blood, is on the left, the mouth of the heart (os cordis) faces toward the right and emits heat and nourishment in that direction. The conclusion is that the tails of notes ought therefore also to turn toward the right.¹⁴⁶ The passage just summarized suggests rather strongly that the writer was familiar with the Conciliator or the Expositio Problematum Aristotelis, in which the question of the superiority of the right or the left side is raised several times.¹⁴⁷ The purpose of the Conciliator, in particular, was, of course, precisely to expound the differences of opinion on various topics between philosophers and medici. Chronologically, it would have been perfectly possible for either Syphante de Ferrara or Marchetus himself (but more probably the former) to have studied under Peter of Abano in person.

Marchetus or his collaborator also apparently had some knowledge of very elementary geometry. The system of notation recommended in the Pomerium involved the use of a number of different note shapes based on a square, and the choice of a square is justified in geometrical terms; the author noted that,

geometrically speaking, it is certain that a pentagon adds one, not four, angles to a quadrangle. The multiplication of angles beyond four, however, has nothing to do with music but pertains only to geometry.¹⁴⁹ Later, it is explained that it is necessary to subtract space occupied by additional notes from the notes to which they are added: "The reason is geometrical. One space enclosed by the same lines cannot reasonably be in different bodies at the same time."¹⁵⁰

The extent to which Marchetus of Padua succeeded in his evident intention of producing works acceptable to the doctors of arts in the schools is hard to determine. An indication that the Pomerium may have been studied in academic circles is perhaps to be found in the existence of a brief summary of that work entitled Brevis compilatio in arte musicae mensuratae,¹⁵¹ which may have been compiled by Marchetus himself. In the opinion of G. Vecchi and Professor N. C. Carpenter, this summary must have been intended as an aid for students and was clearly destined for school use.¹⁵² Fairly clear evidence that the works of Marchetus were widely read by students of arts at Padua by the early fifteenth century, and therefore probably also at an earlier date, is provided by an attack on Marchetus' musical theories launched by Prodocimo de' Beldomandi. Prodocimo was one of the leading members of the Paduan College of Arts in the third decade of the fifteenth century.¹⁵³ His numerous works on mathematics, astronomy and music include a number of treatises based upon the writings of Jean de Murs, musician and doctor of the Sorbonne.¹⁵⁴ As has

recently been pointed out, exaggerated claims have been made for Jean de Murs as an innovator, and his writings are in reality conservative as regards musical theory.¹⁵⁵ Prosdocimo de' Beldomandi, like Jean de Murs, apparently united impeccable academic credentials with a conservative¹⁵⁶ approach to music. In 1425 he composed a Short treatise against the theoretical or speculative part of the Lucidarium of Marchetus of Padua,¹⁵⁷ in which he mercilessly stripped Marchetus' work of its carefully accumulated pretensions to "scientia." Of Marchetus himself, Prosdocimo wrote scornfully that he was a mere practitioner, with no theoretical or speculative knowledge of music.¹⁵⁸ Since his errors had spread throughout Italy, it was appropriate that one Paduan should undo the damage another Paduan had done.¹⁵⁹ Prosdocimo then proceeded to correct Marchetus' definitions of Greek musical terms and his statements on proportion. Prosdocimo's exposition of musical proportion is incredibly complex, culminating in the statement that "if the proportion of the minor semitone is subtracted from the proportion of the major semitone there remains a proportion that is between 531441 and 524288."¹⁶⁰ Scarcely any part of Marchetus' treatise is left uncriticized, and Prosdocimo himself said that space did not permit him to expose all its falsities.¹⁶¹ The main thrust of the attack is that Marchetus did not understand the ancients, and that his innovations were based upon false premises: "The ancients differ from the moderns . . . let us therefore dismiss these moderns with their Marchetus who spread such impossible errors in music and cling to our ancients

who had the true science of music, and so we will be able to acquire the true science of music ourselves."¹⁶² Frequent citations of Boethius indicate that Prosdocimo gave him pride of place among the ancients.

It is to be presumed that the learned Prosdocimo de' Beldomandi would not have expended so much effort to disprove a work used only by practicing musicians or in cathedral choir schools. It is obvious that it was precisely the widespread acceptance of Marchetus' pretensions to learning that had infuriated him.

Despite the importance of Padua itself as a musical center in the first half of the fourteenth century, at least one Paduan appears to have studied music in Paris. The name of Antonio Lio,¹⁶³ or Lido, of Padua who may perhaps have been one of a group of medical students sent to study in Paris by Ubertino di Carrara in 1338,¹⁶⁴ occurs in the register of arts students in the University of Paris for the year 1349.¹⁶⁵ Upon his return to Padua, Antonio appears to have taught medicine;¹⁶⁶ his epitaph (1385), however, describes him as, "Artist in music, Parisian doctor."¹⁶⁷ The prevailing contemporary influence in academic music at Paris in the period when Antonio Lio studied there was certainly Jean de Murs, who, as noted, was probably active until about 1350. It may be inferred, therefore, that the work of Jean de Murs was probably known in Padua well before Prosdocimo dei Beldomandi's commentaries thereon. Boethius was probably still the chief text, at Paris as at Padua, and appears to be referred

to in the requirements of the Parisian faculty of arts in 1348, which demanded of the student "something in music and in arithmetic."¹⁶⁸

To sum up, music undoubtedly played a role in the arts curriculum at Padua in both the thirteenth and the fourteenth century. The traditional authorities, and most notably the De Institutione Musica of Boethius were probably used as texts, and may have been studied in conjunction with the musical writings of Peter of Abano. These works may have been supplemented by the treatises of Marchetus of Padua and, by about the middle of the century, by some of the writings of Jean de Murs.

It seems clear that in the schools of Padua before 1350, astronomy was much the most important of the four mathematical arts. Considerably more information is available about astronomy at Padua in the given period than about arithmetic, geometry or music. The names of two lecturers in astronomy, Peter of Abano¹⁶⁹ and Guglielmo di Montorso,¹⁷⁰ are known and those of two others, Pietro da Reggio¹⁷¹ and Jacopo Dondi,¹⁷² can probably be added; to three of these doctors, astronomical works or translations are attributed.¹⁷³ Moreover, as the following account will show, while most of the evidence concerning astronomy at Padua comes from the fourteenth century, more information can be found about its study during the earlier period than is the case with the other arts of the quadrivium. As already suggested, the primacy of astronomy is probably largely due to its association

with medicine, although the notorious patronage of astrologers by the da Romano family¹⁷⁴ may also have helped to encourage scholarly interest in the art.

A reading of the chronicle of Rolandino yields not only a more or less contemporary account of incidents involving the use of astrology at Padua in the mid-thirteenth century, but also evidence of an informed interest in the topic on the part of the chronicler. On several occasions, Rolandino records the dependence upon astrologers of the tyrant Ezzelino da Romano. In speaking of Ezzelino's attempt to found a city named Victoria during the siege of Parma(1247), Rolandino remarked that Ezzelino knew that when the ancients founded cities they took note of the planet in the ascendant, and that he therefore named his new city when the sign of Aries was in the ascendant

first because the sign is of Mars, who is called the god of war, then because it was contrary to the ascendant of Libra in the west, which is the sign of Venus, which is said to be the planet of Parma and Parma's fortune. It seemed as if perhaps he thought that the fortunes of the Parmese, who were in opposition to him, tended toward their fall.¹⁷⁵

"I think," added Rolandino, critically, "that he did not know how far Cancer was from the ascendant."

Another somewhat similar passage describes an episode in the final campaign that led to Ezzelino's overthrow in 1259. On the latter occasion, we are told, Ezzelino selected the day for attack in consultation with his astrologers and wise men. The astrological excursus that follows is perhaps worth quoting at length:

The sign of Sagittarius was in the ascendant, the Sun was in the house of the Virgin, the Moon in Scorpio, Saturn in Aquarius, and Jupiter was turned backward (retroguardus) and directed toward Libra, . . . and the head and tail of the Dragon were in fixed signs. We think that no one could doubt that Ezzelino chose this point and such an hour in the belief that the celestial houses, the planets, and even the disposition of the houses and planets was favorable to him, since in these, being a heathen and an idolater, he greatly trusted. I think he wanted to believe that since Sagittarius was in the house of Jupiter [sic] and since that planet is benevolent, for it is called "Fortuna", then his journey, begun under such an ascendant must be fortunate and prosperous. For I suspect that he noted that Mars was then in (the house of) Leo, for Mars is said by the poets to be the God of War and the sign of Leo is said to be that of strength and lordship of superiority and magnificent power. . . . I think that the sign or house of Mercury, that is the sign of Gemini, he placed seventh and placed in the west, wishing that the wisdom of his enemies and adversaries should fall to him. For Mercury is held to be the god of wisdom, and the seventh house is assigned against adversaries both in astrology and in geomancy. In my view, he confidently awaited and expected these and similar things in his favor and that of his followers from the planets and the houses of the planets. It is greatly to be wondered at that he did not note that the moon was then in Scorpio, since the moon, the lowest of the planets has, in comparison with the rest of the planets, much influence and virtue as regards matters here below; and . . . the scorpion is a venomous animal. . . . 176

Rolandino concluded his analysis by remarking that if it was true, as the mathematici and Gregory the Great said, that those born under the sign of Aquarius ought to be fishermen and those under that of Libra money changers, then surely, by analogy, something connected with an arrow might be expected to happen to anyone either born under the sign of Sagittarius or beginning an enterprise when it was in the ascendant. Thus it was hardly surprising that Ezzelino was struck in the foot by an arrow during the expedition. But Rolandino did not wish to take any more space with the

discussion of such matters, although he believed it could not be denied that one should study as much as possible of any science of which such particulars became available.¹⁷⁷

The two passages just described contain a number of points worth noting. In the first place they indicate the presence in Padua of a group of court astrologers, the "astrologi et sapienti" of Ezzelino. Moreover the remark about the availability of particulars appears to suggest that the astrological details in question were communicated to Rolandino by someone else rather than observed by him personally. If that were the case, the passages may be read as evidence for contact between the astrologers of the court and the masters of arts in the schools.¹⁷⁸

The informed nature of Rolandino's interest in Ezzelino's astrology is particularly striking when compared with the references to the same topic in the Chronicle of the Monk of Padua. The latter author displays none of Rolandino's quite detailed knowledge of the positions and attributes of the planets and signs, but merely refers in general terms to Ezzelino's reliance upon astrologers who studied the stars and the courses of the sun, moon and planets in order to determine propitious moments for their master's undertakings.¹⁷⁹ It does not seem too far-fetched to attribute Rolandino's superior grasp of the subject to his membership in the faculty of arts.

The evidence does not necessarily suggest that the astrologers of Ezzelino were the first to introduce their art into Padua. It is perhaps more likely that Rolandino's remark

about the desirability of studying astrology should be read as meaning that he was pleased to have the opportunity to learn more about instances of the application of a science of which he already had some theoretical knowledge. Yet the astrology known to Rolandino does not appear to have been of a very complex order. He makes no mention of any of the astrological texts of Greek or Arab origin available in the west in the mid-thirteenth century,¹⁸⁰ and the only authorities to which he refers are the unnamed mathematici and Gregory the Great, whose highly simplistic notion of a relationship between the characteristics of the signs of the zodiac and of those born under them is accepted without question. He appears, in short, to have studied the characteristic literary astrology of the early Middle Ages.¹⁸¹ On the other hand, both passages display a reasonably precise knowledge of the apparent positions of the planets and the sun and moon at different times, and hence may imply the use of astronomical tables of some kind. Moreover, Rolandino evidently felt himself sufficiently in command of the technicalities of astrology to offer informed criticism of the methods of Ezzelino and his advisers. His criticism was not, of course, that of a skeptic. As Dr. Arnaldi has pointed out, Rolandino questioned not the validity of astrology as a science, but the efficiency and morality of certain practitioners.¹⁸²

On the basis of the chronicle of Rolandino, therefore, it can be fairly confidently stated that astrology was studied in Padua before the middle of the thirteenth century and that Ezzelino's predilection for astrologers encouraged interest in

their art in lettered circles.

The astronomy and astrology known to Rolandino were simple indeed compared to the highly sophisticated knowledge of those topics found at Padua in the early years of the fourteenth century. In Peter of Abano, the College of Arts had a professor of astrology of more than merely local renown and of immense learning. In his writings, Peter devoted more attention to astrology than to any other subject except medicine. His two major compilations, the Conciliator and the Expositio Problematum Aristotelis are replete with astrological references and interpretations; he was in addition, the author of three exclusively astrological and astronomical works, the Imagines,¹⁸³ the Lucidator,¹⁸⁴ and De motu octave spere¹⁸⁵ and translated a group of astrological treatises by Abraham Aben Ezra, or Avenezra and an astrological work attributed to Hippocrates.¹⁸⁶ Peter's astrological and cosmological ideas have been discussed at length by Duhem, Nardi, Thorndike and other recent scholars and need not be repeated in detail here.¹⁸⁷ However, in view of Peter's pre-eminence among Paduan professors, and the importance he attached to astrology, a brief summary must for the sake of completeness be attempted. It is fairly well known that Peter was an extreme astrological determinist, who made only the barest concessions to the Christian doctrine of freedom of the will. He believed that astral conjunctions controlled everything on earth, including such historical events as the rise of religions, and apparently ascribed to the stars a role in creation as intermediaries between the immutable prime mover and the world of change. He also appears to have

given some credence to the idea that the stars were responsible for the differentiation of at any rate the lower terrestrial species,¹⁸⁸ and ascribed even minor variations in taste to stellar influences.¹⁸⁹

Peter vigorously defended the validity of astrology as a science; of the surviving portion of his principal astrological treatise, the Lucidator, more than a third is devoted to a lengthy disquisition proving the value of the study of the stars.¹⁹⁰ He held that objections to astrology in general often, in fact, derived from unwillingness to accept the Ptolemaic system in place of the physical astronomy of Aristotle.¹⁹¹ The truth was, according to Peter, that the celestial bodies do affect terrestrial affairs, that astrologers can determine their movements with sufficient accuracy for practical application, and that medical astrology can help the sick.¹⁹² Peter devoted an entire differentia of the Conciliator to proving that astrology is necessary to the physician, noting that "Those who pursue medicine as they should and who industriously study the writings of their predecessors, these grant that this science of astronomy is not only useful, but absolutely essential to medicine."¹⁹³ The role of astrology he stated to be twofold: first, astrology enables the physician to know when medicines or surgery can most effectively be applied to the patient; and second, it helps in prognosis.¹⁹⁴ Elsewhere, approaching the matter from a practical, professional standpoint, Peter remarked that no one would willingly entrust himself to a physician who was ignorant of astrology.¹⁹⁵ He firmly rejected the criticisms of astrological medicine brought by Albubatir¹⁹⁶ and

even those of Averroes¹⁹⁷ who had apparently claimed that the immense number of possible astrological conjunctions and the complexity of the calculations involved made it impossible to determine what, if any, effect the stars had on human health.¹⁹⁸ If the most distinguished and influential professor of the College of Arts of Padua held views such as those just outlined, it is hardly open to doubt that the study of the stars played an important part in the arts and medical curriculum.

Moreover, the astrology taught by Peter of Abano was based on the study of an extremely wide range of learned authorities. Unmistakably, his knowledge of and interest in this subject was vastly superior to his grasp of the other quadrivial arts; to be convinced of this fact, one has only to compare the rather limited and old-fashioned range of authorities referred to in his writings on mathematics and music with those mentioned in connection with astronomy.¹⁹⁹ Among Greek authorities, Peter knew the Quadripartitum, Almagest and Centiloquium of Ptolemy²⁰⁰ and he also refers to the astronomical theories of Theon of Alexandria,²⁰¹ and Anaxagoras.²⁰² Among the Arabs, he was familiar with and discussed the arguments of Haly Abenragel,²⁰³ Alpetragius,²⁰⁴ Albumasar,²⁰⁵ Albubatir, Messahalach,²⁰⁶ Thabit ben Kourah,²⁰⁷ Avempace, Abulbasch,²⁰⁸ Alfraganus,²⁰⁹ Al Zarkali,²¹⁰ Al Sufi,²¹¹ Albategni,²¹² and Alhacel.²¹³ The most widely used of all medieval astronomical texts, the elementary Sphere of Sacrobosco was perhaps referred to by Peter when he cited the "introduction ad artem spericam."²¹⁴ Rather surprisingly, he does not appear to have been familiar with the Alfonsine Tables.²¹⁵

In general, it may be said that Peter of Abano's astrology which on occasion involved the use of such primitive devices as images and incantations,²¹⁶ was always based upon the detailed study of apparent celestial motions. Nor was his learning entirely theoretical or second-hand, as the foregoing imposing list of authorities might suggest, since upon at least two occasions he is known to have made personal astronomical observations.²¹⁷

Certain themes recur in Peter of Abano's writings on astrology, and presumably constitute the main thrust of his teaching on that topic. A brief account of some of his principal preoccupations follows. In line with normal medieval practice, Peter of Abano divided astrology into the astrology of motions (i.e. physical astronomy) and judicial astrology. In Peter's scheme, judicial astrology included but was not exclusively concerned with predictions concerning human affairs; he divided the scientia judiciorum²¹⁸ as follows:

1. Introductory (introductiva ad iudicia)

2. Practical (exercitativa)

- A. Revolutions

- i. conjunctions

- ii. the revolution of the year according

- to the entry of the sun into the beginning
of Aries²¹⁹

- iii. changes in weather and rainfall

- B. Nativities and their revolutions

- C. Interrogations

- D. Elections and images

According to this scheme, several topics which today might be considered as parts of astronomy or meteorology are placed under the heading of judicial astrology.

Peter, of course, accepted that the universe consisted of nine spheres, one each for the moon, the sun, and the five known planets, one for the fixed stars, and a ninth sphere, or *primum mobile*. The ninth sphere, itself motionless imparted motion to the rest.²²⁰ He noted that there were three main cosmological theories, the Aristotelian, the Ptolemaic, and a third, "which was not developed much before the time of Avemparicius Abuisach." The third theory resembled the Aristotelian hypothesis in postulating that the celestial bodies were carried by rigid concentric spheres whose center was the center of the earth, but differed from it in supposing that all the spheres were moved by a single mover at the same rate and with a single motion.²²¹ Peter himself preferred the mathematical Ptolemaic cosmology, which gave a fairly accurate account of the apparent motions of the heavenly bodies by postulating that they moved in fluid spheres according to a system of epicycles and eccentrics. Peter emphasized the superiority of the Ptolemaic cosmology on a number of different occasions. In addition to mentioning the topic several times in the Expositio Problematum Aristotelis and the Conciliator,²²² he intended to devote no fewer than four of the ten proposed differentia of his unfinished Lucidator to various aspects of the system of epicycles and eccentrics.²²³ This repeated emphasis perhaps suggests that the superiority of the Ptolemaic system was

still by no means taken for granted by the audience for which Peter of Abano was writing.²²⁴

Peter of Abano was particularly interested in the motion of the eighth sphere, or sphere of the fixed stars, a subject to which he devoted an entire treatise, On the Motion of the Eighth Sphere, a differentia of the Lucidator,²²⁵ and passages in the Conciliator²²⁶ and the Expositio Problematum Aristotelis.²²⁷

Ptolemaic astronomers believed that the diurnal motion of the eighth sphere from east to west was accompanied by a simultaneous, slow motion from west to east. This theory was developed to account for the observed phenomenon of the precession of the equinoxes, first noted by Hipparchus in the second century B. C.²²⁸ As a result of this phenomenon, the constellations of the zodiac no longer appeared in the fourteenth century in the positions allocated to them by the Greek astronomers. Peter of Abano was among those who consequently postulated the existence of two zodiacs, one the zodiac of actual visible constellations in the eighth sphere, moving at an infinitely slow rate; the second an immobile, invisible zodiac in the ninth sphere, which consisted of zodiacal signs in positions corresponding to those given to the actual constellations by ancient astronomers.²²⁹ Peter himself made astronomical observations to determine the extent in 1303 and again in 1310 of the discrepancy between the mobile and the immobile zodiacs,²³⁰ a discrepancy that he believed to be of

the utmost astrological significance. He held that great historical events, including the rise of new religions, were liable to occur in periods, like that of classical antiquity, when the two zodiacs more or less coincided. When the difference between the two zodiacs was relatively great, as in Peter's own day, astrologers and particularly medical astrologers were presented with serious problems in calculating the influence of the celestial signs.²³¹ It was presumably for these reasons that Peter attached special importance to determining the precise nature and rate of the motion of the eighth sphere. His treatise on the topic reviews a number of theories, including those of Al Zarkali and Thabit ben Kourah, which postulated a third, oscillatory motion of the sphere of fixed stars in addition to the diurnal and long term motions described by Ptolemy.²³² Peter himself accepted the Ptolemaic hypothesis regarding the nature of the motions involved,²³³ but noted the superior accuracy of more recent calculations of the rate of movement. Instead of the movement of the fixed stars one degree eastward in a hundred years postulated by Ptolemy, Peter accepted an eastward movement of one degree in seventy years.²³⁴ Thus he held that the complete circuit of the equinoxes would take 25,200 years rather than the 36,000 Ptolemy had supposed. Although Peter of Abano was a fervent advocate of Ptolemaic astronomy, he did not hesitate to correct and supplement Ptolemy in the light of more recent knowledge when necessary. Nonetheless, Peter several times referred to the Pythagorean belief that after the completion of a "Great Year" of 36,000 years, everything would revert to its original state, and may in some sense have accepted the idea, if

not the exact calculations involved; yet he cited Aristotle against the belief that things would be numerically the same at the completion of such a cycle.²³⁵

Peter of Abano was aware of astronomy as an historically progressive science, noting that understanding of the subject had improved since antiquity. He was much concerned to ensure that medical astrologers employed current data and methods and did not rely on outmoded astrological systems. Galen's system of calculating the critical days of illness he abandoned, because in Galen's time the motions of the moon, which govern the critical days, were not perfectly understood and Galen was, in any case, no astrologer. Peter then proceeded to explain at considerable length how to calculate the critical days in accordance with the current state of astronomical knowledge.²³⁶

Further evidence for the existence of a flourishing school of astronomy, no doubt dominated by the teaching of Peter of Abano, at Padua in the first two decades of the fourteenth century is to be found in the extraordinarily detailed description of the comet of 1315²³⁷ inserted in Mussato's De Gestis Italicorum Post Henricum VII Caesarem. To recount this event, Mussato dropped his elaborate pseudo-classical style and adopted an unambiguous and straight-forward manner which perhaps echoes a description of the comet supplied to him by a scholarly observer:

In this year about the Kalends of December signs were seen in heaven. That is, a star with a tail (stella crinita), which our astrologers call a comet. This comet moved with a daily motion and in the epicycle of Jupiter. For as much as Jupiter, going out in his epicycle in the northern latitude, declined, so much

the comet, ascending, moved toward the Arctic pole; not, indeed, covering the same distance, but proportionately. For at the seventeenth hour on December 25th it was 18 degrees 37 minutes and 53 seconds from the pole; on January 15th, at the seventeenth hour, it was only 9 degrees, 48 minutes and 39 seconds from the pole. . . . ²³⁸

Mussato added that the comet was generally held to be a portent of plague. His knowledge of astronomy was that of an interested amateur. No doubt he acquired some basic knowledge of the subject when he studied the liberal arts in Padua in his youth, presumably in about the early 1280s; there are various references to astrology in his writings, including some mention in the Ecerinide of the superstition of Ezzelino. The inclusion of detailed astronomical observations in the De Gestis Italicorum is very probably a result of Mussato's rather close association with the Paduan College of Arts. In any case, the passage shows that there was in Padua in 1315 a group of astrologers who made astronomical observations and interpreted them in the light of the Ptolemaic cosmology; and that knowledge of astronomical measurements and the details of the Ptolemaic system was sufficiently widespread and generally understood to be accessible to an educated non-specialist such as Mussato. ²³⁹

Little is known of astrological teaching at Padua in the generation following the death of Peter of Abano. The names of two doctors learned in astrology are associated with Padua in that period, but almost no information is available concerning either of them. Pietro da Reggio, who was said by Scardeone to have accused Peter of Abano of heresy in 1315²⁴⁰ is described as "phisicus" in a Paduan notarial document of 1307,²⁴¹ and was perhaps

still living in Bologna in 1363.²⁴² According to Colle,²⁴³ Pietro da Reggio was a professor at Padua, but, as Gloria pointed out, there is no definite evidence to that effect.²⁴⁴ He is probably the same as the Pietro dei Guerri da Reggio who in collaboration with Aegidius de Tebaldis of Parma translated a work of Haly Abenragel on judicial astrology into Latin in 1318.²⁴⁵

Of Guglielmo di Montorso, who is said to have taught astronomy in Padua in 1338,²⁴⁶ practically nothing can be related with any certainty. The statement that he was dear to Francesco di Carrara the elder,²⁴⁷ is perhaps suggestive of the continuation of a tradition, going back to the days of Ezzelino, of an association between the learned astrology of the schools and the practical astrology of the court.

The next in the series of astronomers associated with the schools of Padua in the first half of the fourteenth century was Jacopo Dondi, the distinguished father of Giovanni Dondi, a yet more distinguished son. Jacopo, who passed some of his early life in Chioggia, where he was elected municipal physician in 1313, appears to have established himself in Padua by 1343.²⁴⁸ As noted,²⁴⁹ Jacopo Dondi was undoubtedly a professor of medicine at Padua, and in all probability lectured in astrology as well, since in both fields he left learned works evidently designed as reference aids for students and practitioners.²⁵⁰

Jacopo's astronomical writings consist of two sets of tables. One of these was apparently an abbreviation and simplification of the Alfonsine Tables, adapted to the meridian of Padua.

III-43

According to Prodocimo dei Beldomandi, who wrote a commentary on Jacopo's tables, they were in some respects more accurate than their prototype.²⁵¹ The Alfonsine Tables, supposedly unknown to Peter of Abano by about 1310²⁵² had thus become available to Paduan students by the 1340s; quite possibly they were accompanied by the popular canons, or rules for use, of John of Saxony, which survive in numerous manuscripts, and appear to have been in use at Bologna at a slightly later period.²⁵³

The second set of tables compiled by Jacopo Dondi was presumably intended primarily for the use of medical astrologers; Jacopo held that the place of the moon at the time of conception was the same as the ascendant at the time of birth, and hence of significance in individual prognosis. He therefore compiled tables to eliminate the arduous task of calculating the ascendant separately for each case.²⁵⁴

Jacopo's tables, although noteworthy as examples of his interest in precise measurement, are not, of course, his principal claim to fame as an astronomer. He is best known for the remarkable astronomical clock which he constructed with the patronage of Ubertino da Carrara and which was installed in the tower of the Carrara palace in 1344.²⁵⁵ This mechanical clock, of which a fifteenth century clock now standing in Padua is believed to be an exact copy, measured not only the hours of the day, but also the days of the month, months of the year, and phases of the moon. Mechanical clocks were known in Italy from at least the first decade of the fourteenth century, although at that time they were,

of course, still rarities. Jacopo was not, therefore, the inventor of the instrument,²⁵⁶ although Gloria persuasively suggested that the mechanical measurement of the days, months and phases of the moon, in addition to the hours, might have been novelties introduced into Italy by him. Some indirect support for this idea is perhaps found in the fact that Peter of Abano, who included a lengthy description of the working of a clepsedra, or water clock in the Expositio Problematum Aristotelis,²⁵⁷ appears not to have mentioned mechanical clocks. One might suppose that an author of such wide astronomical learning would mention any new instrument of astronomical significance that was known to him. If he did not do so, it suggests either that he knew nothing of mechanical clocks, or that those he knew of measured only the hours of the day.²⁵⁸

In addition to designing the clock on the Carrara tower, the elder Dondi may conceivably have helped his son construct the elaborate planetarium, showing the courses of the sun, the moon, and the five known planets, for which Giovanni Dondi is famous.²⁵⁹ The career of Giovanni Dondi, physician, astronomer, and friend of Petrarch, falls outside the scope of the present study, since he does not appear to have begun to teach at Padua until about 1350 and his planetarium was not completed until 1364.²⁶⁰ Work on the planetarium was, however, begun about 1348,²⁶¹ when the elder Dondi was still active. Although Giovanni is said to have constructed it entirely with his own hands, it seems inconceivable, as Gloria pointed out, that when a father and son

had such similar interests, the father should not have contributed some suggestions at least to his son's project.²⁶²

Giovanni's planetarium was designed, according to its maker, to illustrate the "subtle and complex theory of Campanus, which he teaches in his Theory of the Planets."²⁶³ The Theorica Planetarum which was in the Middle Ages sometimes attributed to Campanus of Novara and more often to Gerard of Cremona, is considered by a recent scholar to be of unknown authorship and to date from about the middle of the thirteenth century.²⁶⁴ It is an introductory text setting forth the Ptolemaic theory of planetary motion clearly and concisely. As already noted, it probably served to supplement the Sphere of Sacrobosco in the astronomical curricula of many schools of arts in the later thirteenth and fourteenth centuries. A similar association of the two works at Padua is indicated by the fact that Giovanni Dondi began to lecture on the Sphere in 1359.²⁶⁵

The main conclusions that can be reached concerning the study of astronomy at Padua before 1350 are as follows. Astronomy held a more important place than the other quadrivial arts throughout the period under discussion, partly because of its intimate association with medicine, and partly perhaps because astrologers enjoyed the patronage, successively, of the da Romano and the Carrarese.²⁶⁶ Even in its early stages Paduan astrology appears always to have been associated with actual observation of the heavenly bodies, as the chronicle of Rolandino shows. There was,

however, a steady development in knowledge and skill, from the rather vague observations recorded by Rolandino, to the detailed measurements of degrees of celestial movement noted by Peter of Abano and Mussato, and the correction of the Alfonsine Tables by Jacopo Dondi. Peter of Abano's slightly combative stance in defense of Ptolemaic cosmology indicates that it was apparently still not universally accepted at Padua at the beginning of the fourteenth century. The inherent superiority of the Ptolemaic system as a basis for observation, together with the influence exerted by Peter of Abano in its favor, secured its general use by about 1315, when Mussato, who was not a professional astronomer, referred to it without comment.

The texts used by beginning and intermediate students of astronomy at Padua as elsewhere, were probably the Sphere of Sacrobosco and the Theorica Planetarum, perhaps with the addition of the treatise on the quadrant of Robertus Anglicus. To these, between about 1310 and sometime shortly after 1340, were apparently added the Alfonsine Tables, soon adapted in a specifically Paduan edition. More advanced scholars had at their disposal the Almagest and Quadripartitum of Ptolemy, almost the whole range of Arab authorities in Latin translation, and the astronomical treatises of Peter of Abano.

FOOTNOTES TO CHAPTER III

1. For a general account of the study of the quadrivial arts in the Middle Ages, see Abelson, The Seven Liberal Arts; Josef Koch, ed. Artes Liberales (Leiden-Köln: E. J. Brill, 1959), Actes du Quatrième Congrès International de Philosophie Médiévale: Arts Libéraux et Philosophie au Moyen Age (Montreal: Institut d'Etudes Médiévales, Paris: Librairie Philosophique J. Vrin, 1969); for an account of the study of music in the medieval university centers see L. Ellinwood, "Ars Musica," Speculum XX (1945), 290-299.

2. John of Sacrobosco, fl. in the early thirteenth century. He appears to have taught at Paris and was the author of the Tractatus de sphaera and the Algorismus prosaicus. See L. Thorndike, The Sphere of Sacrobosco and its Commentators (Chicago: University of Chicago Press, 1949), p. 2, for what is known of his career.

3. Prosdocimo de' Beldomandi lectured at Padua from 1422 until 1428. For his career and writings see A. Favaro, "I lettori di matematiche nella Università di Padova dal principio del secolo XIV alla fine del XVI," Memorie e Documenti per la Storia della Università di Padova (Padua, 1922), I, 1-70 at pp. 31-32 and the same author's "Intorno alla vita ed alle opere di Prosdocimo de' Beldomandi matematico padovano del secolo XV," Buletino di Bibliografia e di Storia delle Scienze Matematica e Fisiche, ed. B. Boncompagni, XII (Rome, 1879), 1-74, 115-251.

F-III-2

4. See P. Kibre, "The Quadrivium in the thirteenth century universities (with special reference to Paris), Actes du Quatrième Congrès, pp. 175-191.

5. In addition to the article by Professor Kibre cited in the preceding note, mention may be made of G. Beaujouan, "L'enseignement de l'arithmétique élémentaire à l'université de Paris aux 13 et 14 siècles: de l'abaque à l'algorithme," Homenaje a Millas-Valllicrosa (Barcelona: Consejo Superior de Investigaciones Científicas, 1954), I, 93-124; O. Pedersen, "The Theorica-Planetarum literature of the Middle Ages," International Congress of the History of Science, No. 10 (1962), Acts I, 615-618, where it is pointed out that the frequent occurrence of the Sphaere in manuscripts from about 1250 with the Theorica Planetarum often attributed to Gerard of Cremona, provides evidence that both works were similarly used as texts; J. A. Weisheipl, O. P., "Curriculum of the Faculty of Arts at Oxford in the Early Fourteenth Century," Medieval Studies XXVI (1964), 143-185; also useful is the article of P. Delhaye, "Le place des arts liberaux dans les programmes scolaires du XIII siècle," Actes du Quatrième Congrès, p. 161-173. Reference may also be made to the works of Thorndike and Ellinwood cited in notes 2 and 1 above.

6. See above, pp. 49-53.

7. "Magister Agnus, magister Iohannes, magister Zamboninus, profundi et periti doctores in physica et sciencia naturali" (Rolandino, Cronica, 12.19, pp. 173-174.

F-III-3

8. The term "astrology" is here and throughout this study used to include both physical astronomy (the so-called "astrology of motions") and judicial astrology. But it should be noted, as Professor Thorndike pointed out, that Peter of Abano was familiar with the modern distinction between the terms "astrology" and "astronomy" before 1313, although he held that they denoted two branches of one science. (Peter of Abano, Conciliator, Diff. 10, fol. 14r; Thorndike, History of Magic, II, 890-891).

9. See Abelson, The Seven Liberal Arts, where this identification is suggested. The Algorithmus Demonstratus is a brief treatise on practical arithmetic that explains the Arab system of notation and various operations, such as addition, subtraction, multiplication, etc. M. Cantor, Vorlesungen über Geschichte der Mathematik (3 vols., Leipzig, 1880-1908), II, 49-61, attributed it to Jordanus Nemorarius, but G. Kneström (Bibliotheca Mathematica, XIII (1913), 289-332), claimed it as the work of a certain "Gernardus," and the latter attribution is apparently now generally accepted.

10. The list of texts required of students of mathematics and astronomy is included in the Statutes of the University of Medicine and the Arts of Bologna compiled in 1405. (C. Malagola, Statuti delle Università dello Studio Bolognese, p. 276). While this list does not necessarily represent the actual arts curriculum at Bologna at that date, since by the fifteenth century the student universities no longer effectively controlled the choice of texts and professors (see P. Kibre, Scholarly Privileges, p. 42), there is no reason to suppose

that the books named were not read. Since the list is of interest for purposes of comparison with Padua, it is reproduced in full: "In astrologia in primo anno primo legantur algorismi de minutis et integris, quibus lectis, legatur primus geometrie Euclidis cum commento Campani. Quo lecto, legantur tabule Alfonsi cum canonibus. Quibus lectis, legatur theoricæ planetarum. In secundo anno primo legatur tractatus de sphaera, quo lecto, legatur secundus geometrie Euclidis, quo lecto legantur canones super tabulis de linerijs. Quibus lectis, legatur tractatus astrolabij Mes[s]achale. In tertio anno, primo legatur Alkabicius, quo lecto legatur Centiloquium Ptolomej cum commento haly. Quo lecto legatur tertius geometrie, quo lecto, legatur tractatus quadrantis. In quarto anno primo legatur quadripartitus totus, quo lecto, legatur liber de urina non visa. Quo lector, legatur dictio tertia almagesti." The date of the reception at Bologna of the Alfonsine Tables, the complete Euclid, and the works of Ptolemy has not been established.

11. See Kibre, "The Quadrivium in the thirteenth century universities," p. 181.

12. See pp. 142-145.

13. See note 88, Chapter II.

14. The De institutione arithmetica of Boethius (ed. G. Friedlein [Leipzig, 1867, reprinted Frankfurt am Main: Minerva G. M. B. H., 1966]) was a standard arithmetical text throughout the Middle Ages. Boethius based his work on that of Nichomachus (fl. c. 100 A.D.) and Euclid.

See D. E. Smith, History of Mathematics (New York: The Athenaeum Press, 1925), II, 5-6.

15. In the Problemata Aristotelis several *particulae* (Nos. 15, 16 and 17) are devoted to questions characterized as mathematical. These are therefore necessarily discussed by Peter in his exposition. However not all the so-called mathematical problems would be recognized as such today. For instance, there are problems on how the terms "prius" and "posterius" are to be understood (17.3) and why the limbs of plants and animals are generally more or less circular in section (16.8).

16. "determinat problema circa quadrivium sive mathematicas scientias difficilia valde" (Expositio Problemata Aristotelis, 15.1). This is the only occasion on which I have noted the expression "quadrivium" in the sources used in preparing the present study.

17. "huiusmodi dimensiones (sc. of plants and animals) possunt dupliciter accipi, aut secundum quantitatem abstractam consideratam a mathematico et ita procedit in inductio, vel secundum naturalem contractem et qui naturalia quanta sunt corporea una dimensio non potest ab aliis separare. . . ." (ibid., 17.2).

18. Ibid., 15.1. The relevant passage of Isidore is printed in E. Bréhaut, An Encyclopedist of the Dark Ages (New York: Columbia University Press, 1912), p. 125. Lucius Apuleius was the first translator into Latin of the arithmetic of Nichomachos. Most of Apuleius' scientific writings are lost, but several mathematical and astronomical treatises attributed to him are noted in TK, 253, 870, 1003, 1522, 1622.

19. "Dicendum quod mathematica est duplex, una simplex ut arithmetica et geometria, alia vero relata ceu musica et armonia" (Expositio Problematum Aristotelis, 17.2).

20. "Demonstrationes enim de genere in genus non saliant" (Conciliator, Diff. 139, fol. 191v).

21. Ibid., Diff. 1, fol. 3r.

22. Expositio Problematum Aristotelis, 15.2.

23. Ibid.

24. "Cubus autem numerus dicitur quod numerus bis in seipsum conducitur, ut bis duo bis octo, ter tria ter 27" (Conciliator, Diff. 49, fol. 70r).

25. The identity of Jordanus Nemorarius who appears to have flourished in the first half of the thirteenth century has been the subject of much dispute. He is probably not to be identified with the Dominican Jordan of Saxony (see Ernest A. Moody and Marshall Clagett, eds., The Medieval Science of Weights [Madison, University of Wisconsin Press, 1952], see pp. 121-122 for a summary of the evidence). If the Algorithmus Demonstratus is not to be attributed to Jordanus (see note 9 to this chapter) Peter's citation of Jordanus does not necessarily imply acceptance of Arabic notation. Jordanus' other works on arithmetic, the Arithmetica Demonstrata or De arithmetica (printed Paris, 1496, Klebs 563.1) is a theoretical discussion, largely along traditional Boethian lines, of the properties of numbers. It is, however, note-

F-III-7

worthy for the introduction of letter symbols (Abelson, The Seven Liberal Arts, pp. 105-106, note). In addition to the works named above, Jordanus was the author of a treatise on algebra entitled De numeris datis (edited by P. Treutlein in Zeitschrift für Mathematik und Physik, XXXVI [1891], Supplementheft), and of Geometria vel de triangulis (edited by M. Curtze in Mitteilungen des Copernicusvereins für Wissenschaft und Kunst zu Thorn, VI [Thorn, 1887]) and of treatises on weights that are edited in Moody and Clagett, The Medieval Science of Weights, pp. 121-227.

26. For these works and their use in the faculties of arts, see G. Beaujouan, "l'enseignement de l'arithmétique," passim.

27. For the career and writings of Leonardo Fibonacci see M. Cantor, Vorlesungen über Geschichte der Mathematik, II, 3-85. Cantor established that Leonardo's Liber Abaci was written about 1228, rather than in 1202 as has been claimed.

28. Abelson, The Seven Liberal Arts, p. 111. The date 1422 is that given by Favarro ("I lettori di matematiche," p. 31).

29. "claris litteris non [per] zyphras" (H. Denifle, ed., "Die Statuten der Juristen-Universität Padua," Archiv für Literatur- und Kirchengeschichte des Mittelalters, VI (Freiburg, 1892), p. 453.

30. On Witelo's career and writings, see Clemens Baeumker, "Witelo, ein Philosoph und Naturforscher des XIII Jahrhunderts," Beiträge zur Geschichte der Philosophie des Mittelalters, III, Part 2 (Münster, 1908): also the same author's "Zur Biographie des Philosophen

F-III-8

und Naturforschers Witelo," Historisches Jahrbuch, XXXIII (1912), 359-361; A. Birkenmajer, "Studja nad Witelonem," Bulletin International de l'Académie Polonaise des Sciences et des Lettres, Classe de Philologie, Classes d'Histoire et de Philosophie, 4 parts, Années 1918-1922; the fourth of these studies concerns Witelo at Padua, but unfortunately only a brief French summary is printed (Année 1922, pp. 6-9); a longer Italian version was published on the occasion of the celebration of the seventh centenary of the University of Padua in 1922 as A. Birkenmajer, "Witelo e lo studio de Padova," Omaggio dell'Accademia Polacca di Scienze e Lettere all'Università di Padova nel settimo centenario della sua fondazione (Padua, 1928), pp. 147-168, but all scholarly apparatus was omitted; Sarton, Introduction to the History of Science, II, Part 2, 1027; Eva Tea, "Witelo, Prospettico del secolo XIII," L'Arte: Revista di Storia dell'arte Medioevale e Moderna, XXX (1927), 3-30. A bibliography of secondary material on Witelo, including a few items other than those mentioned above, is contained in A. Birkenmajer, "Witelo, Najdawniejszy Śląski uczeni," Polski Śląsk, XVI (Katowice, 1936), 7-32, at p. 32 (the text of this article, which is in Polish, has not been used in preparing the present study).

31. Written between 1270 and 1278 (Birkenmajer, "Witelo, e lo studio di Padova," p. 157), the Perspectiva was printed in Opticae Thesaurus Albazeni . . . item Vitellonis Thuringipoloni, ed. F. Risner, (Basle, 1572). I have consulted the copy at the New York Public Library.

32. Birkenmajer, "Witelo e lo studio di Padova," pp. 156-165.

F-III-9

33. According to Birkenmajer the explicit of a manuscript of two short tracts by Witelo on penitence and the nature of demons (Paris: Bibliothèque Nationale, Cod. lat., 14796) runs as follows: "Explicit tractatus de primaria cause penitencie et de natura demonorum, quem . . . fecit Witelo studens in iure canonico. . . ." (*ibid.*, p. 160).

34. That is, the Perspectiva and the De intelligentiis, a neo-Platonic treatise on the hierarchy of the intelligences that supposedly controls the celestial spheres. The De intelligentiis was attributed to Witelo by Clemens Basenker, who printed it at pp. 1-72 of "Witelo, ein Philosoph und Naturforscher des XIII Jahrhunderts," but this attribution is rejected by Birkenmajer, "Witelo e lo studio di Padova," p. 156.

35. The dedicatory letter prefaced to the Perspectiva by Witelo informs the reader that the work was written at William of Moerbeke's request (Witelo [Basle, 1572], pp. 1-2).

36. On William of Moerbeke see M. Grabmann, "Guglielmo di Moerbeke, O.P., il traduttore delle opere di Aristotele," Miscellanea Historiae Pontificiae, XI (Rome, 1946), 1-94.

37. According to a note in Bodleian Library, MS. Ashmolean 424, quoted in Grabmann, "Guglielmo di Moerbeke," p. 56, "Frater Wyllmus de Moorbeke . . . transtulit physicam Aristotelis de Greco in Latinum ad preces sancti Thomas de Aquino et ob cuius fratris regatum mag. Vittulonis flos mathematicorum condidit presentem perspectivam [of Archimedes] ipse autem socius fuit magistri Campani qui fecit parvum almagesti et commentavit Geometriam Euclidis."

F-III-10

38. See note 35 to this chapter.

39. "In primo itaque huius scientiae libro axiomata praemittimus, quae praeter elementa Euclidis huic scientiae sunt necessaria" (Witelo [Basle, 1572], Bk. 1, proemium, p. 3).

40. Ibid., 1.20, p. 10 cites Book 11 of Euclid; citations of the earlier books are frequent.

41. Ibid., 1.6, p. 6. For surviving manuscripts of this work see TK, 1391-1392.

42. Witelo (Basle, 1572), 1.90, p. 35. Apollonius of Perga flourished in the third century B. C. See G. Sarton, Introduction to the History of Science, I, 173-175.

43. Witelo (Basle, 1572), 1.100-101, p. 38. For Serenus or Serenos, see Sarton, Introduction to the History of Science, I, 353.

44. Witelo (Basle, 1572), pp. 7-8. Eutocius flourished in the sixth century A. D. His commentaries on Archimedes were translated by William of Moerbeke (Marshall Clagett, Archimedes in the Middle Ages [Madison: University of Wisconsin Press, 1964]), p. 7.

45. Abelson, The Seven Liberal Arts, p. 116.

46. Birkenmajer, "Witelo e lo studio di Padova," pp. 148-149, where it is pointed out that references to his stay in Paris are contained in Witelo's De natura demonorum.

F-III-11

47. See Kibre, "The Quadrivium in the Thirteenth Century Universities," p. 183.

48. See Favaro, "I lettori di Matematiche," pp. 24-29.

49. Birkenmejer, "Witelo e lo studio di Padova," pp. 148-149, p. 161, and note 33 to this chapter.

50. Peter of Abano appears to have been familiar with the Perspectiva of Witelo, but made little attempt to utilize any of the geometrical analysis therein contained (see p. 232).

51. Mostly in particulae, 16 and 17.

52. "quoniam in nono Euclidis dicitur quod perfectus numerus appellatur qui omnibus partibus quibus numeratur est equalis. . . ." (Conciliator, Diff. 49, fol. 70r). Peter does not appear to have obtained this statement via Boethius.

53. Expositio Problematum Aristotelis, 15.1; 16, 17.

54. "apud mathematicos enim punctum fluere imaginatum causat lineam" (ibid., 15.1). See also Smith, History of Mathematics, II, 274, 275.

55. Expositio Problematum Aristotelis, 16.5.

56. Ibid., 16, 8.

57. "Eget etiam geometria scientia magnitudinum mensurativa; ut ea vulnere cognoscat figuras. Rotunda namque tardius ac difficilis sanantur" (Conciliator, Diff. 1, fol. 3r). It is, of course, true that

round wounds are often more dangerous than wounds of other shapes, in that round wounds are usually punctures, which involve the hazards of penetrating vital organs and introducing deepseated infection. An accurate observation has been supplied with a faulty causal nexus.

58. Ibid., Diff., 64, fol. 92r, quoted in Thorndike, History of Magic, II, 885. Peter discussed perspective at some length in the Expositio Problematum Aristotelis; see below, pp. 233-234.

59. "Quod autem sub polo artico sint homines alios peredentes ad hunc hodie reperitur sicut mihi Petro Padubanensi relatum est a dignis fide viris in Perusia. Similiter in gallicis ens partibus audivi a sociorum fidelissimo in finibus Noroegie fore spiritus quam multos quos homines signaculis crucis expellunt. . . ." (Conciliator, Diff., 67, fol. 97v-98r.

60. See note 45 to this chapter.

61. See note 41 to this chapter.

62. See note 10 to this chapter.

63. Biblioteca Universitaria, Padua, Ms. 1077, inc. "Punctus est cuius pars non est. Linea est. . . ." (i.e., Euclid, Elements, trans. Adelard of Bath, versio 2). See TK 1152: fol. 16r. Tractatus quadrantis, inc. "Geometrie due sunt partes theorica et practica," fol. 23 expl. "Tractatus hunc compilavit magister Robertus Anglicus." Robertus Anglicus fl. c. 1231. A number of manuscripts of this treatise survive; it is also attributed to Johannes Anglicus and John of Montpelier (TK 585).

64. See pp. 137-138.

65. "Pueri gallorum a principio sapientes apparent procedentes vero in augmentum infatuantur continue. Italicorum autem econverso" (Expositio Problematum Aristotelis 30. 12).

66. Favaro, "I lettori di matematiche," pp. 24-29, gives an account of Biagio's career.

67. A lengthy bibliography of this incident is supplied by Favaro (ibid., p. 28). The earliest version of it is found in the fifteenth century life of Vittorino, by F. Prendilacqua (edited by G. Branbilla, Como, 1871). I have not seen this work and cite it from Thorndike, History of Magic, IV, 70.

68. In his helpful account of Biagio's career and writings, Thorndike, History of Magic, IV, 65-79.

69. Biagio Pelacani, the most distinguished mathematician up to his own time ever to teach at Padua was a doctor of arts, but not of medicine (ibid., IV, 70). According to Favaro, Prosdocimo de' Beldomandi, Biagio's pupil, who became a professor at Padua in 1424, was the first Paduan doctor to be described as lecturing in mathematics (Favaro, "I lettori di matematiche," p. 31).

70. This expression is commonly used for the polyphonic secular music that developed in France and Italy during the fourteenth century. (See Willi Apel, Harvard Dictionary of Music [Cambridge: Harvard University Press, 1955]), pp. 56-68.

71. Marchetus of Padua, Lucidarium, ed. M. Gerbert, Scriptores Ecclesiastici de Musica sacra potissimum, Typis S. Blasianis, 1784, III, 64-121.

72. Marchetus of Padua, Pomerium, ed. J. Vecchi, Corpus Scriptorum de Musica, VI, American Institute of Musicology, Rome, 1961.

73. For discussion of the dating of Marchetus' works see p. 131. and notes.

74. N. Pirrotta, "Marchettus de Padova and the Italian Ars Nova," Musica Disciplina, IX (1955) 57-71, at p. 67. The work of Antonio da Tempo is printed in G. Grion, Delle rime volgari, Bologna, 1869; I have not seen it.

75. G. Reese, Music in the Middle Ages (New York: W. W. Norton 1940), p. 362.

76. Pirrotta, "Marchettus de Padova and the Italian Ars Nova," p. 68. The manuscript described is Vat. Rossi 215.

77. In the Conciliator the discussion of music is mostly in Diff. 83; in the Expositio Problematum Aristotelis it is mostly in Particula 19, de armonia, although music is also referred to in Particula 11, de voce.

78. See G. Vecchi, "Medicina e musica, voci e strumenti nel 'Conciliator', (1303) di Pietro d'Abano," Quadrivium: studi di filologia e musicologia medievale, VIII (Bologna, 1967), 5-22 at p. 5 for references.

79. The passage of Isidore in question is found in William D. Sharpe, ed. and trans., "Isidore of Seville: The Medical Writings," Transactions of The American Philosophical Society, New series, LIV, Part 2, at 64.

80. Conciliator, Diff. 1, fol. 3r.

81. Music is listed along with the other liberal arts as necessary to the physician in Diff., 1 of the Conciliator, but the only reason given for the necessity of music is a reference to Diff., 83, on pulse.

82. Conciliator, Diff. 83, fol. 120r. Cf. Boethius, De institutione musica, ed. G. Friedlein, Leipzig 1867 (reprinted Frankfurt-am-Main: Minerva G.M.B.H., 1966), Bk. I, ch. II, pp. 187-189. Boethius' treatise was of course a standard school text on musical theory throughout the Middle Ages.

83. For a discussion of the musicological ideas of Peter of Abano based principally on Diff., 83 of the Conciliator see G. Vecchi, "Medicina e musica, voci e strumenti nel 'Conciliator'," pp. 5-22.

84. D. circa 1050; his principal work is a treatise entitled Micrologus (J. Smits van Waesberghe, ed. [Nijmegen, Netherlands: American Institute of Musicology, 1955]).

85. The whole of the following summary is drawn from Conciliator, Diff. 83, fols. 120r-122r.

86. "Dupla quoque est cum de numeris maior continet minorem: ut quatuor duo. Ex qua quidem consurgit diapason in per omne sive totum

appellata. Tripla quoque cum maior numerus ter minores numerat; ut tria ad unam extant. Ex qua simphonia consurgit composita dyapente dyapason nominata." (Conciliator, Diff. 83, fol. 120v). The whole passage on proportions appears to follow closely Boethius, De Inst. Musica (ed. Friedlein), I.4-6, pp. 191-194.

87. G. Vecchi, "Medicine e musica," p. 13.

88. "Pulsus scientia gravis est et difficilis et cognitio ipsius cum magna suscipitur difficultate. . . ." (Conciliator, Diff. 83, fol. 122r).

89. Expositio Problematum Aristotelis, 19.1.

90. Ibid. For a discussion of the significance of this ancient distinction, see R. Crocker, "Musica rhythmica and musica metrica in antique and medieval theory," Journal of Music History, XI, No. 1 (April, 1958), 2-23.

91. Expositio Problematum Aristotelis, 19.3.

92. Ibid.

93. Ibid., 19.5.

94. Ibid., 19.6.

95. "dico autem perfecte grammatica quia grammatici et potissime gallice maxime utuntur. . . ." (ibid., 19. 20). The reference is perhaps to the cursus?

96. Ibid., 19. 37.

97. Ibid., 19. 1.

98. G. Vecchi is, however, of the opinion that some parts of Peter's commentary on the musical portions of the Problemata may have been based on a text either defective or misunderstood (Vecchi, "Musica e medicina," p. 11).

99. As his comments, just noted, upon sung epics and comedy show.

100. These two treatises represent the first theoretical account of the development of the Italian ars nova. Whether or not they owe anything to the French school and in particular to the almost contemporaneous works of Philippe de Vitry, whose Ars nova was written about 1320, has been much discussed, but remains unresolved. See Pirrotta, "Marchettus de Padua and the Italian Ars Nova," pp. 58-59 for a summary of the controversy. The work of Philippe de Vitry was known to and admired by Petrarch (Reese, Music in the Middle Ages, pp. 336-337) later in the century, but it is not known whether it had been introduced to Padua before the poet took up residence there in 1349. Marchetus was aware of, and discussed the differences between Italian and French practice (Pomeribus, ed. Vecchi, p. 173).

101. The little that is known about Marchetus is summed up and an extensive bibliography concerning him and his works provided in a scholarly article by H. Hüschen in Die Musik im Geschichte und Gegenwart, Allgemeine Enzyklopädie der Musik, Bärenreiter Kassel, Basel, London,

F-III-18

New York, 1960, VIII, 1262-1630. The only contemporary information concerning Marchetus' life appears to be that contained in his various works, which were written at Cesena and Verona and which recent authorities have dated between about 1318 and 1324. (see pp.131-132 and notes.) Prodocimo de' Beldomandi, writing about a hundred years after Marchetus, stated that Marchetus was a Paduan. (R. Baralli and L. Torri, "Il 'Trattato' di Prodocimo de' Beldomandi contro il 'Lucidario' di Marchetus di Padova," Rivista Musicale Italiana, XX (1913), 707-762 at 731.

102. The Lucidarium was written for Raynerius de Zaccaria de Urbeveteri, vicar general of King Robert of Naples (1309-1343) in the Romagna in 1317-1318 (Lucidarium, ed. Gerbert, p. 65 and N. Pirretta, "Marchettus de Padova and the Italian Ars Nova," p. 59). The statement in Grove's Dictionary of Music and Musicians (5th ed. New York: St. Martin's Press, 1955), V. 572 and earlier sources that Marchetus was in the service of Rainier, Prince of Monaco is probably based on this dedication. There does not seem to be any evidence that Marchetus was ever in France. The Pomerium is dedicated to Robert of Naples (Pomerium, ed. Vecchi, p. 35-37), but G. Vecchi, "Su la composizione del Pomerium di Marchetto da Padova e la Brevis compilatio," Quadrivium, I (Bologna, 1956), 156, considers that there is no reason to believe that Marchetus ever visited Naples as some earlier writers claimed.

103. Gerbert, Scriptores Ecclesiastici, III, 64. The manuscript is Milan, Ambrosiana, col. D 5 in fol. 15c, fols, 52-77.

104. Ibid.

F-III-19

105. Marchetus, Pomerium, ed. Vecchi, Introduction, p. 25.
106. O. Strunk, "Intorno a Marchetto da Padova," La Rassegna Musicale, XX (1950), 312-315.
107. Lucidarium, ed. Gerbert, p. 69; Pirrotta, "Marchettus de Padua and the Italian Ars Nova," p. 60.
108. See above, p. 64.
109. The suggestion is made by Vecchi, "Su la composizione del Pomerium," p. 159.
110. Strunk, "Intorno a Marchetto da Padova," p. 314.
111. Pirrotta, "Marchettus de Padua and the Italian Ars Nova," p. 63.
112. Vecchi, "Su la composizione del Pomerium," p. 158.
113. Pomerium, ed. Vecchi, p. 36, 209; Lucidarium, ed. Gerbert, p. 65. Nothing else appears to be known of Syphante de Ferraria, who is not mentioned by J. Quétif and J. Echard, Scriptores Ordinis Praedicatorum (2 vols., Paris, 1719-1721; reprinted New York: B. Franklin, 1969).
114. "Sed ipsi possent dicere: Frater, tu prius distingdisti caudes. . . ." Pomerium, ed. Vecchi, p. 44.
115. "Explicit Pomerium artis musicae mensurabilis magistri Marcheti de Padua," (ibid., p. 210).

116. "Divina auxiliante gratia brevem tractatum compilare intendo de arte musica, et hoc primo ad eruditionem meam, secundo ad profectum discentium, pro majori parte ex libris Boethii ac excellentissimi doctoris musicae videlicet Magistri Marchetti Patavini extractum" ("Liber Ligaturarum," Rome, Bibliotheca Vallicelliana, MS. B. 83, 15c, fols. 18r-30v, preface). I have not seen this unique manuscript, and cite it from the article of R. Hüschen in Die Musik in Geschichte, VIII (1627).

117. "quilibet cantus, qui absque temporis mensura et limitatione notularum figuratur et cantatur. . . ." (Lucidarium, ed. Gerbert, 1.15, p. 60).

118. "Musica mensurata est quilibet cantus tempore mensuratus, cuius figurae sunt omnes limitatae nomine, figura, et quantitatis essentia. . . ." (ibid.)

119. "opus quo universi musici et cantores scierent rationabiliter in plana musica quid cantarent" (Lucidarium, ed. Gerbert, Proemium, p. 65).

120. Cf. De Institutione Musica, ed. Friedlein, 1.34, pp. 223-225, especially "Is vero est musicus, qui ratione . . . canendi scientium non servitio operis sed imperio speculationis adsumpsit."

121. "Musicus enim cognoscit virtutem et rationem proportionum musicalium et secundum hoc iudicet et non solum per sensum" (Lucidarium, ed. Gerbert, 16.1, p. 121).

F-III-21

122. "Ex hoc siquidem musicis et cantoribus ostendetur quod pars haec musicae quae speciali serie temporis mensura deducitur non absoluto voluntatis arbitrio sed rationis ordine producta luceat, et velut pars scientiae musicae subalterna. . . ." (Pomerius, ed. Vecchi, Proemium, p. 37).

123. At the beginning of the Lucidarium, for example, Marchetus wrote that he had composed the treatise: "adiuvante me fratre Syphante de Ferrari ordinis praedicatorum, tam circa libri ordinem, quam in ipso libro necessarius, suas philosophicas rationes . . ." (Lucidarium, ed. Gerbert, p. 65).

124. See note 113 above.

125. Lucidarium, ed. Gerbert, 1.1, p. 65, "De inventione musica."

126. Ibid., 1.3, pp. 65-66. Cf. above, p. 126.

127. "quasi domina imperat": (ibid., 1.4, p. 66).

128. "Quid sit musica. Musica est ars spectabilis cuius sonus in caelo et in terra modulatur. Item musica est scientia quae in numeris proportionibus quantitibus mensuris coniunctionibus et consonantiis consistit" (ibid., 1.5, p. 67).

129. Ibid., 3.1-11, pp. 76-79, and 7.1, pp. 87-88.

130. Ibid., 4.2, p. 78.

131. Ibid., 2.3, p. 70.

F-III-22

132. Ibid., 9.1, p. 72.

133. "Hoc enim subiectum est non permanens sed mobile; et in hoc, quod mobile est, comparatur cum astrologia, quae quidem est de subiecto mobile et permanenti. In hoc quod musica est in subiecto non permanenti comparatur cum geometria, quae est de subiecto non permanenti sed immobile, scilicet de terra" (ibid., 12.1, p. 117).

134. Remigius or Rémy of Auxerre (fl. 893) was the author of a commentary on a musical portion of the work of Martianus Capella. The commentary is printed in Gerbert, Scriptores Ecclesiastici, I, 63-94.

135. Huobald of St. Amand died ca. 930. His only authentic work appears to be a treatise entitled, De harmonica institutione (see Grove's Dictionary of Music and Musicians, IV (1955), 396).

136. Lucidarium, ed. Gerbert, 11.3-4, pp. 103-117.

137. Ibid., 9.1, p. 92 ff.

138. Ibid., 2.5-9, pp. 72-75; tract. 11, p. 101 ff. For Prosdocimo de' Beldomandi's criticism, see pp. 138-140.

139. Franco was the author of Ars cantus mensurabilis (c. 1260), edited in E. de Coussemaker, Scriptorum Medii Aevi de Musica (Paris, 1869), I, 117-136. Apparently it is the earliest extant treatise on mensurated music. According to the index of authorities found on pp. 213-214 of Vecchi's edition of the Pomerium, Franco is cited nine

times and Aristotle ten. The works of Aristotle cited are De anima (twice), Physics (three times), the Metaphysics (four times, but one citation is repeated), and the Topics and the Ethics (once each).

140. For a general account of the place of Marchetus' system of notation and note values in the history of music see A. Harman, Medieval and early Renaissance music (London: Rockliff, 1958, pp. 154-155). His system appears to have proved too complex and unwieldy for prolonged general use, but the concept of mensurated music, i.e., music measured in precise time intervals was of the greatest significance in the development of the art.

141. "via scientifica in praesenti opere procedamus, viam philosophicam imitantes . . ." (Pomerium, ed. Vecchi, Proemium, p. 40).

142. "Nam de accidentibus non est scientia, sed solum de essentialibus et intrinsecis pertinentibus ad unamquamque scientiam. Sed substantialia et intrinseca cantus sive musica sunt notae, in quibus ipsa scientia musicae essentialiter consistit" (ibid., 1.5, p. 75).

143. "Sed musica est quaedam scientia et consideratio mensurae temporis perfecti pertinentis ad ipsam et ipsa est in intellectu; et intellectus est separatus a materia, et per consequens scientia, et quidquid pertinet ad ipsam. Si ergo Petrus, ex asperitate organi, non potest formare nisi tres semibreves, ipsae non debent determinari ad hoc quia Martinus potest formare novem . . ." (ibid., 1.7.6, p. 154).

144. "Philosophus in Metaphysica . . . dixit quod primum quod est in unoquoque genere est mensura; et est illud perfectum quo omnia

quae sunt illius generis mensurantur" (ibid., 1.5.3, p. 82).

145. "Ars imitatur naturam in quantum potest (per Philosophum, secundo Physicorum). Probatio per exemplum: nam qui depingit liliū vel equum nititur ipsa depingere in quantum potest ad similitudinem equi seu lilii naturalis. Cum igitur ipsae notae scripta ad artem musicae pertineant, licet ipsa musica de se accepta scientia, oportuit ergo quod proprietatibus additae notis ipsis, scriptis propter necessitatem modo tradendi, adderentur eisdem secundum perfectiones repertas ab ipso homine qui instituit talem artem" (ibid., 1.1.2, pp. 50-51).

146. Ibid., p. 51-52.

147. See, e.g., Conciliator, Diff. 99, fols. 141r-143r and Expositio Problematum Aristotelis, 6.5 and 6.7.

148. Many more than are in use today. See Harman, Medieval and Early Renaissance Music, p. 154.

149. "Et primo loquimur geometricè: Certum est quod pentagonus addit supra quadragonum unum angulum; est ergo ista bona conclusio: Pentagonus non addit supra quadragonum tot angulos quot habebat quadragonus, sed solum unum angulum Sed talis perfectio non innuitur per multiplicationem angulorum (puta faciendo pentagonum vel exagonum) cum de ipsis nihil ad musicam, sed solum ad geometriam" (Pomerium, ed. Vecchi, pp. 72-73). Almost the same statement is repeated on p. 199.

150. "et sit ratio geometrica talis; Unum spatium ab eisdem in eis inclusum non potest simul esse in diversis corporibus rationabiliter" (ibid., p. 199).

151. Edited by G. Vecchi at pp. 177-205 of "Su la composizione del Pomerium." This supersedes the edition in Coussemaker, III, 1-12.

152. Vecchi, "Su la composizione del Pomerium," p. 163; N. C. Carpenter, Music in the Medieval and Renaissance Universities (Norman: University of Oklahoma Press, 1958), p. 43.

153. See note 3 to this chapter.

154. Jean de Murs flourished from before 1323 until about 1350. At least two of his treatises were written at the Sorbonne. Many spurious works are attributed to him, but it appears that the Musica speculativa (ed. Gerbert, III, 255-283) and the Speculum musicae (ed. in part, Coussemaker, II, 193-433) are probably his. See Grove's Dictionary of Music and Musicians (1955), V, 1005-1008, and Thorndike, History of Magic, III, 294-324.

155. Grove's Dictionary of Music and Musicians (1955), V, 1005-1008.

156. The term is perhaps not well chosen, since the thirteenth century writers who repeated whole passages from St. Augustine, Macrobius, and Boethius (see Ellinwood, "Ars Musica," passim) were of course conservative too. The difference as regards Prosdocimo de' Beldrandi is that he did not merely ignore recent musicological developments, but went out of his way to pour scorn on them. His attitude no doubt

reflects a faster pace of musical innovation in the fourteenth century than in the thirteenth.

157. Opusculum contra theoricam partem sive speculativam Lucidarii Marchetti Patavini. It is edited, with an introduction, in R. Baralli and L. Torri, "Il 'Trattato' di Prosdocimo de' Beldondani contra il 'Lucidario' di Marchetto di Padova," Rivista Musicale Italiana, XX (1913), 707-762.

158. Ibid., p. 731.

159. Ibid.

160. "Nam si a proportionem semitonii maioris proportio semitonii minoris subtrahatur restabit proportio quae et inter 531441 est 524288" (ibid., p. 74).

161. Ibid., p. 762.

162. "Discrepant tamen Antiqui a modernis . . . Dimittamus ergo istos modernos cum suo Marcheto qui talis impossibilia et in musica erronea seminarunt et adheremus antiquis nostris qui veram musicae scientiam habuerunt, et sic ipsam veram musicae scientiam acquirere poterimus" (ibid., p. 752).

163. Gloria, Monumenti, 1318-1405, I, 370-371.

164. See P. Kibre, Scholarly Privileges, p. 65 and below, pp. 286-287.

165. H. Denifle and E. Chatelain, Chartularium Universitatis Parisiensis, II, Part 1, no. 1100, p. 558 and No. 1165, p. 634, cited

in Kibre, Scholarly Privileges, p. 65.

166. Gloria, Monumenti, 1318-1405, I, 370.

167. "Musicus artista, Doctorque Parisius iste" (ibid).

168. "Aliquid in musica et in arithmetica," quoted in P. Wagner, "Zur Musikgeschichte der Universität," Archiv für Musikwissenschaft, III (1921), 1-6, at p. 4. I have been unable to find this in Denifle and Chatelain, Chartularium under the year 1348.

169. Peter identified himself as professor of astronomy in his will. See above, p. 73 and note.

170. Gloria, Monumenti, 1318-1405, I, 446-447. This account, which is said to contain errors is supplemented by Favaro, "I lettori di matematiche," pp. 18-19. According to Favaro, the claim that Guglielmo lectured on astrology in the faculty of arts at Padua is first found in L. Vedriani, Dottori modenesi di teologia, filosofia, etc. (Modena, 1665), p. 52.

171. Gloria, Monumenti, 1222-1318, 366; Colle, Historia Scientifico Letterario, III, 155-156; and Favaro, "I lettori di matematiche," pp. 17-18, summarize what little information is available. Gloria did not accept Pietro da Reggio as a professor.

172. For Jacopo Dondi see Gloria, Monumenti, 1318-1405, I, 371-376, and Gloria's articles, "I due orologi meravigliosi inventati da Jacopo e Giovanni Dondi," Atti del R. Istituto Veneto di scienze, lettere

et arti, LIV, Seventh series (1895-1896), 664, 737, and "L'orologio inventato da Jacopo Dondi, ibid., LV, Part 2, Seventh series (1896-1897), 1000-1017; Thorndike, History of Magic, III, 386-402, with bibliographical footnotes; Sarton, Introduction to the History of Science, III, Part 2, 1669-1671, with bibliography. An earlier work, V. Bellemo, Jacopo e Giovanni de' Dondi (Chioggia, 1894), I have not succeeded in obtaining. Jacopo was certainly a professor of medicine at Padua since he was so described eleven years after his death in a notarial document of November 29, 1370 (Gloria, Monumenti, 1318-1405, II, 85). Since he wrote astrological as well as medical works, there is a strong presumption that he also lectured on astrology.

173. Peter of Abano, Pietro da Reggio, and Jacopo Dondi. See pp. 146, 154-156.

174. According to Rolandino, excessive dependence upon astrology was a family trait among the da Romano; incorporated in the Chronica Marchie Trivixane is a supposed letter of 1222 from the elder Ezzelino to his sons Ezzelino and Alberic which refers to "matrem vestram qui stellarum cursus noverat, notabat celestes domos, sciebat enim iudicia planetarum" (2.15, p. 38). Among Ezzelino the younger's astrologers were the celebrated Guido Bonatti, "Master Salio, Canon of Padua" (who sounds as if he may have had some connection with the Paduan schools), and Ribrandino of Verona (C. S. Haskins, Studies in the History of Medieval Science [New York: Frederick Ungar Publishing Company, 1960], p. 258).

175. "Tum quia signum est Martis, qui dicitur deus belli, tum quia erat Libre ascendenti contrarium in occasum, quod est signum Veneris, qui planeta Parme dicitur et esse fortuna eius. Quasi per hoc forsitan cogitaret, quod Parmensium fortuna, qui opposita ei erat, tenderet in occasum" (Rolandino, Cronica, 5.11, p. 84).

176. "tunc fuit ascendens Sagittarii signum, Sol erat in Virgine, Luna in Scorpione, Saturnus in Aquario eratque retroguardus Jupiter in Libra directus, Mars in Leone similiter et directus, Venus in Cancro directa, Mercurius in Leone directus, caput autem et cauda Draconis in signis fixis. Neminem quoque credimus dubitare quod elegit Ecelinus hoc punctum et horam talem, credens celestes domos, planetas eciam domorumque dispositionem et planetarum favere sibi, quoniam in hiis quam plurimum tamquam gentilis et ydolatra, confidebat. Volebat, ut puto, credere quod, cum sit Sagittarius domus Iovis et sit ille planeta benivulus, nam et Fortuna dicitur, debebat esse fortunatum et prosperum eius iter sub tali ascendente inceptum. Suspicio eciam quod notavit Martem in Leone tunc esse, nam Mars a poetis dicitur deus belli et signum Leonis dicitur fortitudinis et domini, altitudinis et magnifice potestatis. . . . Puto eciam quod signum sive domum Mercurii, signum videlicet Geminorum, posuit septimum et posuit in occasum, volens quod inimicorum et adversancium ei sapientia caderet. Nam Mercurius deus sapientie ponitur, et septima domus sive in astrologicis sive in geomaticis semper adversantibus assignatur. Hec et hiis similia de planetis et de domibus planetarum in favorem suum et sue gentis diligenter attendit et expectavit, ut credo. Mirum tamen quod non notavit Lunam

in Scorpione tunc esse, cum Luna infimus planetarum in hec inferiora inter ceteros (sic) planetas multum habeat influenciam et virtutem; et cum scorpio venenosum sit animal. . . ." (Rolandino, Cronica 12.2, p. 160).

177. "neminem redarguere deceat, qui pro posse de omnia sciencia studeat, cuius possit particulam qualem qualem (sic) habere" (ibid., p. 161).

178. Whether Rolandinus received his information as regards the episode of 1247 at the time, when the schools of Padua were either in abeyance or very restricted in function (see pp.8-9 above), or after the fall of Ezzelino is not clear from the text.

179. "Convocavit insuper ad se coelestium corporarum sollicitus exploratur Astrologos et Divinos: praecipiens eis supputare menses, sidera contemplari, et signa Coeli consideratione acutissima perscrutari: ut indubitanter scire posset, quando erit tempus ad movendum exercitum opportunum. Tunc illi tam motuendi principis imperiis obsequentes, diligenter investigarunt Solis, Lunaeque cursum, Planetarum motum et signorum effectus: et artis peritia illustrati, diem, et horam, et punctum evidentissime invenerunt. . . ." (Chronica Monachi Paduani, ed. RIS [1726], VIII, 692).

180. Such as the Almagest of Ptolemy, translated into Latin twice in the twelfth century, or the works of Albumasar (d. 886), the astrologer who was, according to G. Sarton, "more frequently quoted in the west than any other" (Introduction to the History of Science, I, 568-569).

181. Thorndike, The Sphere of Sacrobosco and its Commentators, p. 15.

182. Arnaldi, Studi sui Cronisti, p. 178.

183. This work appears to exist in only one manuscript: Munich, cod. lat. 22048, 15c, ff. 158v-176v, which I have not seen, but cite from L. Thorndike, "Manuscripts of the writings of Peter of Abano," Bulletin of the History of Medicine, XV, no. 2 (February, 1944), 201-219. Part of the material in this manuscript is printed in the Astrolabium Planum compiled by Johannes Engel, Augsburg, 1488 (Klebs 175.1), which I have consulted at the Pierpont Morgan Library, New York. The work consists of a series of astrological diagrams, stated in the preface to be based on a latitude of 45 degrees, which is that of Padua. In each diagram the "image" is a human or animal figure representing the attributes of a particular celestial position; each image is provided with a descriptive caption and is surrounded with various zodiacal signs and calculations. The calculations appear to be elaborate, but the predictions involved are quite crude, e.g., a picture of a man in chains is captioned thus: "Homo stans erectus captus utraque manu cathena una: Homo iste sepius incarcerationatus erit." Both the manuscript and printed versions identify the work as that of Peter of Abano. The statement occasionally found that Peter of Abano wrote on the astrolabe appears to stem from the title of the printed version of this work.

184. The known manuscripts of the Lucidator are listed in Thorndike, "Manuscripts of the writings of Peter of Abano," at pp. 210-211.

I have used Vatican palat. lat. 1171, 14c, ff. 320r-337r, inc. "Quoniam astrologice considerationis ambiguitates. . . ." The work has never been printed, although according to information communicated to the writer by Mlle. Marie-Thérèse D'Alverny, editions of both Peter's Lucidator and his De motu octave sphere are now in preparation under the supervision of Professor Maccagni of the Domus Galileana, Pisa. Written requests for information about these proposed editions have, however, elicited no reply from Pisa. For discussion of the Lucidator see A. Favaro, "Pietro d'Abano ed il suo Lucidator Astrologicae," Atti del R. Istituto Veneto di Scienze, Lettere ed Arti, LXXV (1916-1917), part 2, 515-527; Duhem, Le système du monde, IV, 241-263, and Thorndike, History of Magic, II, 879-880.

185. For manuscripts of this work, which has never been printed, see Thorndike, Manuscripts of the writings of Peter of Abano, pp. 211-212. I have used Vatican, palat. lat. 1171, 14c, f. 317r-320r, inc. "Incipit tractatus que petrus padubanensis construxit in motu 8^{ve} spere cuius sunt 4^{or} distinctiones . . . Quoniam iuxta Ptholomeum. . . ." A version of this treatise appears as Differentia 7 in some manuscripts of the Lucidator, as is established in Duhem, Système du Monde, IV, 246-248. The contents of the De Moto octave spere are discussed by Duhem together with those of the Lucidator (See note 184 to this chapter.)

186. Abraham Aben Ezra (d. 1169), Jewish astrologer, fl. Toledo. The titles of the treatises translated by Peter are, according to Thorndike, History of Magic, II, 927, Liber introductorius, De electionibus, De interrogationibus, De revolutionibus nativitatum, Liber rationum,

Liber luminarum et de cognitione diei cretici, and Tractatus particulares.

See Thorndike, History of Magic, II, 878n; the same author's "The Latin translations of the astrological tracts of Abraham Avenezra," Isis, XXXV (1944), 293-302; and Duhem, Système du Monde, IV, 204. Regarding Peter's translation of the supposedly Hippocratic work, which was also translated by William of Moerbeke, see L. Thorndike, "The Three Latin Translations of the Pseudo-Hippocratic Tract on Astrological Medicine," Janus, XLIX (1960), 103-129. Pearl Kibre, "Hippocratic Writings in the Middle Ages," Bulletin of the History of Medicine, VIII (1945), 399-400; and the latter author's forthcoming study of medieval manuscripts of Hippocratic writings.

187. Duhem, Système du Monde, IV, 229-263; Bruno Nardi, "Intorno alle dottrine filosofiche di Pietro d'Abano," Estratto dalla Nuova Rivista Storica, anno 5, Fasc. I-II, Milan, -Rome-Naples, 1921, and the same author's "La teoria dell'anima e la generazione delle forme secondo Pietro d'Abano," Rivista di filosofia neo-scolastico, IV, No. 4 (1912), 723-727, both articles being reprinted in the author's Saggi sull'Aristotelismo Padovano dal secolo 14 al secolo 16 (Florence: Sansoni, 1958); Thorndike, History of Magic, II, 890-902; E. Troilo, "L'oroscopo delle religioni: Pietro d'Abano e Pietro Pomponazzi," Figure e dottrine di Pensatori, I, Naples, 1932. The last named author is a firm believer in Peter's skepticism and "Averroism," concerning which see pp. 239-240.

188. In Expositio Problematum Aristotelis, 10.13 he noted that some hold that "everything was generated from matter through putrefaction by virtue of higher bodies . . . and this could well be."

189. As in Expositio Problematum Aristotelis, 21.12, where he suggests that astral influences are the reason why "when I see someone

drinking milk and especially mixing it with bread I feel like vomiting, but other people like it very much."

190. Most manuscripts of the Lucidator contain a table of contents listing ten differentiae; of these, only six appear actually to have been written, the seventh which occurs in some manuscripts being, as already noted, a version of the treatise on the motion of the eighth sphere. In Mss. Vat. Palat. 1171, differentia 1, "An astronomia sit scientia" occupies twelve out of a total of thirty-four pages.

191. For example, when he described the argument against astrology as follows: "Loquitur enim de significatione planetarum et aliorum corporum determinata secundum quantitatem et qualitatem cuiuslibet individui omnium specierum. Horum autem cognitio intellectu non potest comprehendí humano . . . dicendum quod hoc dixit de astrologia motuum magis quam de iudiciale, eo quod videbatur ei ipsam fore super falsa principia fabricatam; cum ipsa ponat eccentricos et epíciolos et motus proprios in planetis quibus corpus prescindunt celi qui videntur esse contra determinata secundo celi et mundi," (Conciliator, Diff. 10, fol. 15v).

192. "Vero sciendum primo quod corpora celestia in hec agunt inferiora . . . quod medicus existens astrologus huius potest cognitione habere . . . quod confert astrologia ad salutem egroti" (Conciliator, Diff. 10, f. 14v).

193. Diff. 10, which is entitled "An quis existens medicus possit conferre per scientiam astrorum in salutem egroti," (fols. 14r-16r).

In it he said "Illi vero qui sequuntur medicinam sicut debent; et suorum maiorum dicta diligenter inspiciunt; concedunt hanc scientiam astronomie non solum utilem, sed et necessariam maxime medicine." (Ibid., f. 14v, quoted in Thorndike, History of Magic, II, 893.)

194. Conciliator, Diff. 10, fol. 15v: "Scientia astronomie confert medicine operative dupliciter. Primo quidem debite corpori applicando tria instrumenta medicine, dietam, quidem, potionem, et cirurgia Confert etiam in prognosticando." In the same passage Peter made it clear that the astrologer's knowledge of changes in the weather and of the astrological signs governing the different parts of the body (the head, for example, being under Aries) were particularly useful in medicine.

195. "Medicus qui astrologiam ignorat nullus de se in eius manus ponere" (ibid., Diff. 1, fol. 3r).

196. Or Abu Bakr, astrologer, fl. late ninth century. His best known work, the de nativitatibus was, according to Sarton (Introduction to the History of Science, I, 603), translated into Latin "by one Canonicus Salio in Padua, 1218," a fact which provides yet further evidence of interest in astrology in Padua in the first half of the thirteenth century. Salio apparently later became one of the astrologers of Ezzelino da Romano (see note 174, above).

197. Here referred to as the Commentator. Peter's rebuttal is of interest in connection with his supposed Averroism (see below, pp. 239-240)

198. Conciliator, Diff. 10, f. 14r and passim.

199. The names that follow were selected at random from the pages of the Conciliator, the Lucidator, and de motu octave spere, where some of them recur with great frequency. It is, of course, often impossible to say in individual cases whether Peter was familiar with an author's work at first hand, or merely with his arguments as reported by another.

200. The Quadripartitum is a work on the control of human life by the stars. It was translated into Latin before 1150 and printed in Venice, 1484, 1493 (Klebs, 814.1-2). The Centiloquium, a work attributed to Ptolemy, is also concerned with astrology and frequently occurs in the same manuscripts as the Quadripartitum (Sarton, Introduction to the History of Science, I, 277). The Almagest was, of course, the principal source of knowledge of Ptolemaic cosmology in the west from the twelfth century. The translation of the Almagest by Gerard of Cremona (1175), widely used in the Middle Ages, was printed in Venice, 1515 (see TK 180, 1245).

201. Theon of Alexandria flourished in the second half of the fourth century A. D. and wrote a commentary on the Almagest (Sarton, Introduction to the History of Science, I, 367).

202. Anaxagoras, Greek natural scientist and philosopher, fifth century B. C. Only fragments of his work survive and Peter presumably knew of his arguments via Aristotle (see Sarton, Introduction to the History of Science, I, 86).

203. Or Ibn Abī-L-Rijāl (Albohazen, Alboacen), fl. in North Africa, d. ca. 1040; he wrote mainly on judicial astrology (see Sarton, Introduction to the History of Science, I, 715-716 and TK, 475, 784).

204. Or al-Bitrogī, fl. twelfth century. He was the author of a work upholding the Aristotelian cosmology translated into Latin by Michael Scot in 1217 (Haskins, Studies in Medieval Science, p. 245). For Mss., see TK 86, 252, 424, 405, etc..

205. d. 886. Author of more than twenty-five astrological treatises which survive in numerous manuscripts. The most popular was his Liber introductorius or Introductorium (see TK 221, 156, 196, 116, 655, 813, 1417, 1119).

206. Or Māshāllāh, d. 815 or 820. A prolific author of astronomical treatises, most notably on celestial motions and the astrolabe. Numerous medieval Latin manuscripts of his works survive; for Mss. of his treatise on the astrolabe alone see TK 154, 294, 353, 356, 916, 1015, 1063, 1119, 1409, 1414. See also Sarton, Introduction to the History of Science, I, 531.

207. Or Thābit ibn Qurra, d. 901; he was the author of a treatise on the motion of the eighth sphere (TK 106, 357, 661, 1703) and other astronomical and mathematical works (Sarton, Introduction to the History of Science, I, 599-600).

208. Perhaps Ibn Bajja, usually known in the West as Avempace, fl. Spain, d. 1138-1139. He wrote on medicine, geometry, astronomy and natural science (Sarton, Introduction to the History of Science, I, 183).

209. Or Al-Farghānī, fl. mid-ninth century. His "Elements of Astronomy," was translated into Latin in the twelfth century. For Mss. of his works, see TK 618, 960, 46, 429, 936, 1518. (Sarton, Introduction to the History of Science, I, 567.

210. Al-Zargālī or Arzachel, fl. Spain, d. 1087. He edited the Toledan planetary tables, which were translated into Latin by Gerard of Cremona (and later superseded by the Alfonsine Tables). See TK 525, 1232, 1306, and Sarton, Introduction to the History of Science, I, 758-759.

211. That is, Abd al Rahman Al Sufi, who flourished in the second half of the tenth century. He determined the rate of precession of the equinoxes with considerable accuracy (see Sarton, Introduction to the History of Science, I, 665-666, Aydin Sayili, The Observatory in Islam [Ankara: Türk Tarih Kurumu Basimevi, 1960], pp. 104-107, and note 234 to this chapter). Peter referred to him as Acolphy (De motu octave spere, Vat. Palat. 1171, fol. 318v).

212. Or Al-Battānī, d. 929. One of the most advanced of the medieval Moslem astrologers who wrote a commentary on the Quadripartitum of Ptolemy and a work On the Science of the Stars (see Sarton, Introduction to the History of Science, I, 602-604, and, for Mss., TK 299, 83, 841, 669, 769-770).

213. Or Algazel (Al-Ghazzālī), philosopher and astronomer, fl. Baghdad, d. 1111. Author of a treatise on the nature and motions of the stars. See Sarton, Introduction to the History of Science, I, 753.

214. Conciliator, Diff. 10, fol. 14r.

215. See Duhem, Système du Monde, IV, 259. According to Crombie, Medieval and Early Modern Science, I, 96, the Alfonsine Tables reached Paris about 1293. Peter's *Phisionomia* is dated from Paris in 1295 (Thorndike, History of Magic, III, 877). On the Alfonsine Tables, see also Haskins, Studies in Medieval Science, pp. 16-17.

216. See Thorndike, History of Magic, II, 898-903.

217. In both instances to determine the rate of movement of the eighth sphere of fixed stars (see p. 151): "Inveni tamen tempore moderno quod caput arietis mobilis similiter cancri, libre et capricorni immobilium per 10 gradus et 22 minuta, anno gratie 1303, quo ego Petrus Paduanensis hunc librum construxi. . . ." (Conciliator, Diff. 9, fol. 13r). "usque ad anno eiusdem 1310 in quo ego Petrus Padubanensis observavi id quod opus composui, scilicet xi gradus et 40 merita" (apparently sic = ? minuta), (Lucidator, Vat. Pal. 1171, fol. 327v). Both cited Duhem, Système du Monde, IV, 239.

218. Conciliator, Diff. 10, fol. 14r-v.

219. This refers to the precession of the equinoxes and the movement of the eighth sphere, a topic in which Peter was much interested, (see p. 150).

220. For a brief account of the common assumptions of medieval cosmology, and the differences between the various schools of thought, see Crombie, Medieval and Early Modern Science, I, 75-90.

221. Conciliator, Diff. 10, fols. 15v-16r. Quoted in Duhem, Système du Monde, IV, 242.

222. E.g., Expositio Problematum Aristotelis, 15,15; Conciliator, Diff. 10, f. 15v; Diff. 104, fols. 149v-150r.

223. The table of contents at fol. 320r of the Lucidator (Vat. pal. 1171) lists the following differentias pertaining to this topic:

An sit ponere ecentricos et epiciclos;

An planeta moveantur per se in ecentrico vel epiciclo;

An centrum eccentrici solis distet a terra 2 gradibus
et 23 minutis (? apparently sic - minutis) sive
ipsius equatio;

An sol peragant (sic) eccentricum cuius in 364 diebus et
14^{us} vel aliter.

Of these, the first two were actually written and are found in the manuscript at fols. 230v-235r.

224. Many of the major scholastic writers of the thirteenth century expressed considerable reservations about the Ptolemaic system. According to P. Duhem ("Medieval Physics," in R. M. Palter, ed. Toward Modern Science [New York: E. P. Dutton and Company, 1969], pp. 141-159 at pp. 149-150), William of Auvergne, Albertus Magnus, Vincent of Beauvais, Robert Grossetete, Roger Bacon and Thomas Aquinas all hesitated between the Ptolemaic and Aristotelian cosmologies, although Albertus quite strongly inclined toward the Ptolemaic cosmology. According to A. C. Crombie, this hesitation was caused not only by unwillingness to reject Aristotle entirely on a matter of such importance, but also by doubts about the parts of the Ptolemaic system that postulated simultaneous movement of the stellar sphere in more than one direction (Crombie, Medieval and Early Modern Science, I, 86).

225. "An motus unus celi communis vel plures" (Lucidator, Diff. 2, fols. 325r-329r).

226. Conciliator, Diff. 9, fol. 13r.

227. Expositio Problematum Aristotelis, 10.13; 17.3.

228. See J. R. Ravetz, "The Precession of the Equinoxes," International Congress of the History of Science, No. 10 (1962), I, 606-610. The precession of the equinoxes is actually caused by a movement of the earth's axis.

229. Conciliator, Diff. 10, fol. 14r. Peter was not the first to enunciate this belief. See Duhem, Système du Monde, IV, 239-240.

230. See p. 149 and note 217 above.

231. Conciliator, Diff. 9, fol. 13r; Diff. 10, fol. 14r, and Thorndike, History of Magic, II, 896.

232. Duhem, Système du Monde, IV, 256-259.

233. De motu octave spere, Vat. Palat. 1171, fol. 318r: "motu . . . intransite duplex namque existit. . . ."

234. Ibid., fol. 318v. The passage is cited in Duhem, Système du Monde, IV, 257. The value is that calculated by Al-Sufi, close to the currently accepted figure of about 26,000 years.

235. Expositio Problematum Aristotelis, 10.3 and 17.3.

236. Conciliator, Diff. 104, fols. 149v-150r.

237. This comet is the subject of a brief treatise by Geoffrey of Meaux, edited in L. Thorndike, Latin Treatises on Comets (Chicago: University of Chicago Press, 1950), at pp. 210-214. It was also mentioned by various chroniclers; see A. Pingré, Cométographie, ou traite et théorique des comètes (2 vols., Paris: 1783, 1784), I, 426-428.

238. "Hoc anno circum Kal. Decemb. de Caelo signa conspecta sunt. Stella scilicet crinita, quam Astrologi nostri dixere cometem. Movebatur hic Cometes digmo motu, et epicycli Jovis. Nam quantum Jupiter in epicyclo suo exiens in latitudine Septentrionae declinabat, tantum hic cometes ascendens versus Polum Arcticum gradiebatur, non equidem secundum quantitatis aequalitatem; sed secundum proportionis mensuram. Cum enim 25 die, hora 17 Decembris distaret a Polo gradibus 18, minutis 37, et secundis 53. XV die Januarii hora 17 non distat nisi gradibus 9 minutis 48 et secundis 39. Movebatur quoque planetae motu, propter quod in directum ipsius Jovis mittebat Comae radios, quamquam propter diversitatis aspectum videretur quantum ad aliquid obliquare. Propter quae adjudicabatur patenter Jovem Dominum ejus esse, cujus virtute ipse producebatur. Cometem hunc non aliud, quam futuram in terris pestem portendere plurimorum judicis adjudicatum est." (Mussato, De gestis italicorum, Graevius, VI, part 2, col. 284.)

239. An obvious comparison is the knowledge of Ptolemaic cosmology displayed by Dante. Efforts to prove that Dante obtained his information directly from Peter of Abano have, however, not produced any definite evidence to this effect. See A. Dyroff "Dante und Pietro d'Abano," Philosophisches Jahrbuch--Gorres Gesellschaft, XXXIII (Fulda, 1920), p. 252ff, a reply to B. Nardi, "Dante e Pietro d'Abano," Nuovo Giornale Dantesco, IV (1920), fasc. I, II.

240. Scardone (ed. Graevius) 2.9, cols. 227-228. The probability of this story is discussed in Thorndike, History of Magic, II, 946-947.

241. Gloria, Monumenti, 1222-1318, 366.

242. Colle, Storia Scientifico-Letterario, III, 155.

243. Ibid.

244. Gloria, Monumenti, 1222-1318, 366.

245. Suggested in Colle, III, 155. The work in question is Liber magnus et completus, quem Albohazen Halis, filius Abenragel, composuit de judiciis astrorum, printed Venice, 1485 (Klebs, 31.1).

246. See note 170.

247. G. Tiraboschi, Storia della letteratura italiana (Modena, 1775), V, 151, cited by Favaro, "I lettori di matematiche," p. 19. I have, however, been unable to find this statement in the entries on Guglielmo di Montorso in either Tiraboschi's Storia della letteratura italiana (Milan, 1823), V, 286, or his Biblioteca Modenese (Modena, 1783), III, 294.

248. Gloria, "I due orologi meravigliosi inventati da Jacopo e Giovanni Dondi," p. 680.

249. See note 172 above. Favaro, "I lettori di Matematiche," p. 20, states that a manuscript of some of Giovanni's lectures survived until recent times in the archives of the family of Dondi Orologio, but that he had not been permitted to see it, adding "we cannot say even if it still exists, since despite frequent and reiterated requests we were

not allowed to set foot under the roof where the remains of the Dondi family archives are abandoned to the worms and mice."

250. Jacopo's chief medical work was a massive dictionary of herbal remedies. See below, p. 299.

251. Jacopo's tables are known through the commentary of Prosdocimo de' Beldomandi, where it is stated "in motibus planetarum tabule Jacobi de Dondis Paduani ex Alfonsi tabulis extracte leviores et expeditiores sunt in operando quam Alfonsis tabule ac etiam e que et forsitan melius verificate et correcte," quoted in Favaro, "Intorno alla vita ed alle opere di Prosdocimo de' Beldomandi," p. 161. These tables are apparently the same as those noted in Thorndike, History of Magic, III, 389, namely Bodleian Library, Canon. Misc. 436, 15c, fols. 13r-24v with tables following, "Iacobi de Dondis Patavini Planetarium praevis expositionibus ab anonymo quodam confectis," inc. "Cum plures et varie tabule ad celestes motus composite sint. . . ." See also Thorndike, ibid., III, 198-200 on these tables.

252. See p. 148 and note 215 above.

253. For Mss. of the Canons of John of Saxony, see TK 337, 525, 711, 766, 788. They are referred to in the statutes of the University of Arts and Medicine of Bologna in 1405, which require students to be familiar with "tabule Alfonsicum canonibus" (see note 10, this chapter).

254. These tables appear to survive in two manuscripts, namely Bodleian, Canon Misc. 436, fols. 48v-50r, preface inc. "ad inveniendum primum ascendens nativitatis secundum Iacobum de Dondis," and Vienna, Nationalbibliothek 5208, fol. 43r, "Verum ascendentis gradum per casum seminis rectificare secundum Iacobum Dundum Patavinum." I have consulted the photocopies of these manuscripts bequeathed by the late Professor Thorndike to Columbia University. The tables in the two manuscripts appear to be the same, but only Canon Misc. 436 incorporates Jacopo's own preface; since the preface in the Vienna manuscript refers to Jacopo it is presumably not by him. In his preface Jacopo stated "hoc difficile et tediosum est in calculando, ideo volui abbreviare et facere facile et feci ad hoc tabulas faciles et brevis. . . ."

L. Thorndike "Notes on some astronomical, astrological and mathematical manuscripts of the Bibliothèque Nationale, Paris," Journal of the Warburg and Courtauld Institutes, XX (1957), 112-172, at pp. 128-129 notes the existence of a treatise by the Bolognese astrologer Andalò di Negro based on the same idea as Jacopo's tables, namely that "the place of the moon at the time of conception becomes the ascendant at the time of birth." Among Jacopo's astronomical works ought perhaps to be included his treatise on tides, since it treats of the effects of the heavenly bodies; it is however here discussed under the heading "Natural Science" (see below, pp. 224-226).

255. Jacopo's career, his clockmaking activities, and his claim to be the first holder of the title dell'Orologio, which in subsequent generations became part of the surname of the Dondi family are exhaustively

F-III-46 discussed in Gloria, "I due orologi meravigliosi," passim, from which source all the statements in this paragraph are drawn unless otherwise indicated.

256. According to the late Professor Thorndike, the mechanical clock may have been invented soon after 1271 A. D., when Robertus Anglicus described attempts to construct such an instrument (Lynn Thorndike, "Invention of the Mechanical Clock about 1271 A. D.," Speculum, XVI (1941), 242-243).

257. Expositio Problematum Aristotelis, 16.7.

258. As is well known, Frederick II received a Planetarium as a gift from the Sultan of Damascus in 1232, but exactly how this was driven is not known. Richard of Wallingford constructed a complex astronomical clock in England in about 1320; whether or not Jacopo Dondi could have known of this remains obscure (Crombie, Medieval and Early Modern Science, I, 97-98).

259. It is described in detail in S. Bedini, "Mechanical Universe: The Astrarium of Giovanni de'Dondi," Transactions of the American Philosophical Society, New Series, CVI, Part 5 (October, 1966).

260. Favaro, "I lettori di matematiche," p. 19; Gloria, "I due orologi meravigliosi," p. 701.

261. Gloria, "I due meravigliosi orologi," p. 701.

262. Ibid., pp. 717-718.

263. "Cumpsi autem huius propositi et imaginationis exordium ex subtili et artificiosa imaginatione Campani, quam docuit in sua Theoria Planetarium" (Venice, Biblioteca Marciana, cod. Lat. VIII, 17 [Valentinelli, IV, 262, class 11, cod. 85], Giovanni Dondi, Astrarium or Planetarium). I have not seen this manuscript which is cited in Favaro, "I lettori di matematiche," p. 22 and Thorndike, History of Magic, III, 390. For other manuscripts see TK 198, 158, 1031, 1586.

264. O. Pedersen, "The Theorica-Planetarum Literature of the Middle Ages," International Congress of the History of Science, No. 10 (1962), 1, 615-618. The author notes that there were several treatises by this name of which that usually attributed to Gerard of Cremona was much the most popular.

265. Favaro, "I lettori di matematiche," p. 21, citing the unpublished seventeenth century history of the University of Padua by F. Morelli (Padua, Biblioteca Universitaria, Mss. 1675, p. 167).

266. And perhaps also by the Comune, if the tradition that Peter of Abano suggested to Giotto the themes for paintings for the interior of the Sala da Ragione in Padua is founded on fact. This tradition is accepted by G. Fontanesi, "Motivi d'arte nell'averroismo padovano," Società Italiana per il Progresso delle Scienze, Riunione 26 (1939), III, 322ff.

CHAPTER IV

NATURAL SCIENCE AND METAPHYSICS

The importance of natural science and metaphysics in the arts curriculum at Padua at the beginning of the fourteenth century can perhaps be gauged from the position allocated to these subjects in the educational scheme outlined by Peter of Abano. In his list of the studies necessary for a physician, he included not only arts, but also natural science, treating it as a separate category, distinct from the seven liberal arts. Furthermore, he characterized the study of natural science as "essential."¹ The study of metaphysics he held to be of similar importance, since it sustained the principles on which all the sciences depended.² Thus it would appear that at Padua, as at other university centers, the reception of the great stock of information about the natural world and of metaphysical speculation contained in the works of Aristotle and the Arab commentaries thereon meant that the old categories of the seven liberal arts no longer adequately described all that had to be taught in the arts faculty.³ As St. Thomas Aquinas put it: "Philosophy is commonly divided into seven liberal arts, which include neither natural nor divine science," and "The seven liberal arts do not adequately divide theoretical philosophy."⁴ St. Thomas himself emphasized the autonomous value of natural science, or physics, although he did not deny the importance of mathematics.

For him both mathematics and physics stood in close relationship to the divine science of metaphysics, the subject of which is being, since "changeable substance, which the natural scientist considers, and also quantity, which the mathematician considers, are parts of being."⁵ Moreover, by his use of the term scientiae mediae for those sciences which included both physical and mathematical elements, St. Thomas drew attention to the fact that even the traditional mathematical arts involved some natural science; for example, astronomy concerns the movements of physical bodies.⁶ At Padua, the schools appear to have followed the general trend exemplified by the foregoing remarks of St. Thomas and incorporated the study of natural science and metaphysics, mainly from Aristotelian texts, into the curriculum in the course of the thirteenth century.

At Padua, as at Bologna and other centers of learning, the texts for the study of natural science appear to have been the so-called libri naturales of Aristotle, probably with the addition of other Greek and Arab scientific works.⁷ The date of the introduction of the libri naturales into the curriculum at Padua is not known, but they were almost certainly studied there well before 1300. Aristotle's De anima is cited in the treatise De intelligentiis attributed to Witelo who was at Padua in the 1260s.⁸ Engelbert of Admont, who came to Padua in 1278, had already attended lectures on Aristotle's natural philosophy by Master Gregory de Hasenberg, canon and scholasticus of the cathedral chapter of Prague.⁹ Geremia da Montagnone included citations from the Historia animalium, De

IV-3

generationes et corruptiones, De celo et mundo, De anima, the Meteora, the Physica, and the Metaphysica, as well as the pseudo Aristotelian De plantis, De proprietatibus elementorum and the Problemata in his florilegium compiled in the first decade of the fourteenth century.¹⁰ Numerous references to the libri naturales are scattered throughout the major works of Peter of Abano, to whom the writings of Avicenna and Averroes were also well known. Peter apparently particularly recommended the Historia animalium and De sensu et sensato to students.¹¹ In addition, there are in existence a number of thirteenth and fourteenth century manuscripts of Aristotelian works in natural science of Paduan provenance or ownership.¹²

It does not appear to be possible definitely to determine whether the libri naturales were at Padua part of the formal arts curriculum or were required of students in examinations. The examples of Oxford, Paris, and Bologna suggest that such was probably the case. The crop of learned commentaries which might have been expected to result from the use of Aristotelian works as required texts is, however, rather strikingly lacking at Padua before 1350. The only Aristotelian commentary that can incontrovertibly be said to have been produced at Padua in the period is the Expositio Problematum Aristotelis of Peter of Abano, which was begun at Paris.¹³ Although Engelbert of Admont is believed to have written at least two commentaries on works of Aristotle, both are thought to date from after his departure from Padua and may not have been known there.¹⁴ However, as already noted, the Aristotelian

commentaries of Aegidius Romanus were almost certainly known in Padua soon after 1287.¹⁵ Before that date, Aegidius had written commentaries on the Physice, Metaphysice, De generatione et corruptione, De anima, Phisionomia and De causis, and possibly also on the Meteora, De Celo and Parva naturalia.¹⁶ Apparently, therefore, while some works or parts of works of Aristotle may have been a fixed requirement for study in the Paduan faculty of arts, considerable latitude for individual preferences and interests in the field of natural science may have prevailed. This conclusion is perhaps supported by the rather wide range of natural scientific topics discussed by writers associated with Padua in the period before 1350. Their works suggest that, in the given period, optics, physical and human geography, climate, mechanics, the natural history of plants and animals, and such phenomena as tides, hot springs and the rainbow, were studied there, at least intermittently.

At Padua the teaching of whatever topics were comprised under the heading natural science, was in the thirteenth century in the hands of teachers described as doctors of "phisica et sciencia naturalis",¹⁷ a term indicating the early connection of medicine and natural science in the Paduan faculty of arts. The teachers so designated probably taught medicine together with its principal auxiliary sciences, that is, not only natural science, but also astronomy and the other mathematical arts. This would certainly appear to be implied by the account of Rolandino, since he named only two other divisions of the faculty of arts besides phisica et sciencia naturalis, namely grammar and rhetoric and logic.

Astronomy and mathematics which were undoubtedly taught at the time when Rolandino wrote¹⁸ would not be within the province of professors of grammar and rhetoric, and the professors of logic were probably usually responsible only for formal logical instruction.¹⁹ Thus the professors of phisica et sciencia naturalis seem the most likely candidates for teachers of the quadrivial arts. Moreover the close connection between natural science and metaphysics resulting from the fact that both subjects were studied from Aristotle's works on natural philosophy leads one to suppose that teachers of natural science were probably also responsible for any instruction in metaphysics that was given. It is true that William of Brescia is described as teaching logic and philosophy,²⁰ but the normal placement of logic as a methodological study near the beginning of the arts curriculum, taken together with the association of metaphysics and natural science, perhaps suggests that this arrangement may not have been usual. Likewise, the interests of William of Brescia, later a distinguished physician, may already have leaned toward phisica and natural science in the years he was teaching logic at Padua. The bent toward natural science of Engelbert of Admont,²¹ who was proud to proclaim himself William's pupil, perhaps supports this suggestion. Engelbert's interest in natural science was certainly active during his years at Padua, for he included a detailed account of the working of a mariner's compass that he had seen at Venice, in his treatise on fascination.²²

Such an interpretation of the role of the professors of phisica et sciencia naturalis as that just suggested also fits in

with Peter of Abano's description of himself as professor of philosophy, astronomy, and medicine.²³ These categories, in turn, exactly correspond to the divisions of the arts and medical curriculum in the statutes compiled in 1405 by the Bolognese student university of Arts and Medicine. From the list of texts included in the Bolognese statutes it is evident that at Bologna at any rate "philosophy" included both natural science and metaphysics,²⁴ just as astronomy included mathematics.²⁵

The writers associated with Padua before 1350 who produced works relating to natural science and metaphysics were, in the thirteenth century, Engelbert of Admont and Witelo; and in the fourteenth century, Peter of Abano and Jacopo Dondi.²⁶ Engelbert of Admont wrote commentaries on the pseudo Aristotelian De inundatione nili and De mundo and of treatises on the weather and on the nature of animals.²⁷ Witelo was, of course, the author of a famous treatise on optics.²⁸ Peter of Abano wrote no separate treatise on natural science but included a number of passages on geography, meteorology, climate, and related topics in both the Conciliator and the Expositio Problematum Aristotelis.²⁹ He has also been credited with significant contributions to the development of scientific method.³⁰ Jacopo Dondi wrote brief tracts on tides and on hot springs.³¹ Of these writers, only Peter of Abano and Jacopo Dondi are known to have been professors at Padua, Witelo, as already mentioned, may have lectured in the faculty of arts while a student of canon law; Engelbert was, of course, a student of arts.

To these four doctors should perhaps be added Albertus Magnus, one of the most outstanding natural scientists of the thirteenth century,³² who was, according to a strong tradition, briefly associated with the studium of Padua early in his career.³³ There is a possibility that he may have been received into the Dominican order at Padua during one of the missions of Jordan of Saxony to scholars of that city.³⁴ Perhaps, therefore, Albertus may have been a member of the group of students who left Bologna for Padua in 1222. No details are known with any certainty regarding the length of Albertus' stay or the nature of his studies in Padua.³⁵ The dispute over his birthdate even makes it uncertain whether he was an adolescent or a man of about thirty at the time.³⁶ To doubt that Albertus ever studied at Padua at all, as some scholars have done,³⁷ seems, however, unnecessarily skeptical.

It is definitely known, from statements made by Albertus himself in his writings that he was in Venice during his youth and in Padua at some point in his life,³⁸ and it is hard to conceive of any period in the life of Albertus Magnus when he would not be engaged in study. Whether he was formally enrolled in any association of scholars is, of course, another question.³⁹ It is, however, known that Albertus' interest in natural science was already established when he was at Padua, since the references to Padua and Venice just cited from his works both concern personal observations of natural phenomena. In the passages in question he tells of an accumulation of lethal gas inside a disused well at Padua, and of markings resembling the outline of a king's head found inside a

slab of marble split open in the course of building a church at Venice.

The numerous works on natural science and philosophy written by Albertus Magnus are, however, all ascribed to a period long after that in which he is thought to have been at Padua.⁴⁰ Since his stay there in all probability occupied only a short period at the beginning of a long life dedicated to scholarship, it is virtually impossible to distinguish whatever influence it may have had upon his thought as a whole, and his treatment of natural science in particular. As far as Padua is concerned, it is of considerably more significance that works on natural science by Albertus were known and used by Peter of Abano in the early fourteenth century.⁴¹ However, whether or not these works were studied in Padua in the thirteenth century has not been determined. The contributions of Albertus Magnus to natural science will therefore be discussed in the present study only insofar as they were utilized by writers more closely identified with Paduan intellectual life.

Before proceeding to the discussion of the content of the writings on natural science and metaphysics that can be associated with Padua, it may be worth adding some considerations about the authors as a group. While the sample is very small, some valid conclusions concerning thirteenth and early fourteenth century scholarship at Padua may perhaps be formulated.

There is general agreement that each of the three thirteenth century figures, Albertus, Witelo and Engelbert, came to Padua as a student, not a master, and remained there for a relatively short time before going on to a career elsewhere. Of the three, Witelo is

IV-9

the only one who may perhaps have lectured in the faculty of arts; and as already noted, there seems to be no evidence to support this supposition, probable though it may be. All three came comparatively great distances, that is from northern Europe, to study at Padua. This fact, taken in conjunction with the apparent existence of an association of German scholars at Padua in 1228,⁴² suggests that the city established a transalpine reputation as a center of learning early in the thirteenth century and rapidly recovered that reputation after the collapse of the da Romano tyranny.

A further characteristic shared by Albertus, Witelo and Engelbert was that all three were churchmen.⁴³ All three had both ecclesiastical and scientific interests and wrote on theological or devotional topics as well as on natural science. Albertus, of course, was to become one of the leading theologians of his age; Engelbert was the author of numerous theological and devotional treatises;⁴⁴ Witelo's ostensible purpose in coming to Padua was to study canon law, and he appears to have been the author of a tract on penance.⁴⁵ Unlike most later medieval writers on natural science or philosophy at Padua, none of the three was a doctor of medicine or practising physician. In fact the careers of these three doctors, with their combination of ecclesiastical and scientific learning and their travels to different intellectual centers, coincide with a pattern similarly encountered in the schools of northern Europe in the thirteenth century. Two of the most celebrated examples are Robert Grossetete, Bishop of Lincoln,

doctor of Oxford and Paris, theologian, and writer on optics; and Roger Bacon, minorite Friar, doctor at Oxford and Paris and writer on ecclesiastical and a variety of scientific topics. Finally, Albertus, Witelo, and Engelbert were all three among the leading contributors to the science of western Europe in their day. That the university center of Padua should have attracted students of such caliber from abroad in the first years of its existence is surely remarkable, especially if one considers that the schools of Padua, if functioning at all, were at a very low ebb for over twenty years in the mid-thirteenth century. If the traditional date of 1222 is accepted as a point of departure, there were only about fifty-five years in the thirteenth century when the schools of Padua were sufficiently flourishing to attract foreign students. In such a short space of time to have assisted in forming the minds and interests of natural scientists of the caliber of Albertus Magnus and Witelo is a notable achievement.

Turning to the fourteenth century, one faces a different situation. Unlike the scholars named above, both Peter of Abano and Jacopo Dondi were of local origin,⁴⁶ and both were laymen. Both were physicians whose interest in natural science grew out of and was perhaps always subservient to a primary interest in medicine and astronomy. Setting aside for the moment the disputed question of the radical Aristotelianism of Peter of Abano and its relation to later "Paduan Averroism",⁴⁷ one may note that the careers and interests of Peter and Jacopo fall into the pattern of wholly

secular, medically-oriented science and philosophy for which Padua later became chiefly known. Perhaps, however, the chief difference between the two groups, Albertus, Witelo and Engelbert on the one hand, and Peter of Abano and Jacopo Dondi on the other, is that the former were students at Padua and the latter professors. As already noted, there are clear indications that the association between medicine and natural science was already established among professors at Padua in the thirteenth century.⁴⁸

With regard to the content of teaching in natural science and metaphysics at Padua, the following survey of the material on these subjects in the writings of Paduan doctors may serve to provide some information. In view of the somewhat heterogeneous and scattered nature of the available source material, it seems advisable to classify it as broadly as possible. The following discussion, therefore, will consider (1) earth sciences, comprising geography, geology, meteorology, climate, and so on; (2) the natural history of plants and animals; (3) optics; (4) mechanics; and (5) metaphysics.

The earliest works on the earth sciences that can be associated with Paduan teaching appear to be two treatises by Engelbert of Admont. These are his lost commentary on the pseudo-Aristotelian work On the flooding of the Nile, and his work on The Causes and Signs of changes of air and weather.⁴⁹ Both were probably written after his departure from Padua, but the Aristotelian commentary is believed to date from before 1300⁵⁰ and therefore may have reflected Engelbert's Paduan studies. It is not known whether either work was studied at Padua.

The next doctor associated with Padua to treat of these sciences was Peter of Abano, in whose works physical geography and climate receive a fair amount of attention. For example, the questions discussed in the Conciliator include the relative coldness of earth and water; the relative humidity of water and air; whether the air is naturally hot or cold; whether spring is temperate; whether life is possible below the equator; whether a change of air has more effect than a change of food or water; and whether life is shortened more in autumn than in other seasons.⁵¹ In the Expositio Problematum Aristotelis a good deal of geographical and meteorological discussion, including some of the same material used in the Conciliator is to be found, especially in the particulae on complexions, salt water and the sea, air and winds.⁵²

Peter appears to have derived many of his beliefs about geography, meteorology, and climate from the Quadripartitum of Ptolemy with the commentary of Haly⁵³ and the writings of Albertus Magnus, especially De natura locorum,⁵⁴ since he frequently cited these works or incorporated material from them. He was probably influenced by the Hippocratic treatise Airs Waters Places, which deals with the effect of location and climate on human health and development.⁵⁵ Both Ptolemy and Albertus also stressed the importance of regional and climatic influences upon men and animals. The fundamental thesis of the Quadripartitum is that human life is controlled by the stars, and that the nature of the celestial influence varies in different parts of the earth. In De natura locorum, Albertus emphasizes the influence of locality on human physique and temperament. For example, he pointed out that the men

IV-13

of the fifth climate (i.e., presumably Germans) are tall, extremely handsome and beautiful in coloring, while the men of the fourth climate (i.e., presumably Italians) are little and swarthy.⁵⁶ Not surprisingly, this particular example of regional influence was not repeated by the Italian Peter of Abano. From his study of Galenic medicine, Peter had also acquired the view that heat and cold, and to a perhaps somewhat lesser extent, moisture and dryness, had a major effect on human, animal and vegetable life. He counted their influence second only to that of the stars, and appears to have believed that the presence or absence of the four qualities was ultimately determined by the stars.

Given his acceptance of the beliefs just described, it is not to be wondered at that Peter of Abano devoted considerable space to the discussion of geography and climate. Although much of his exposition is devoted to the theory of the four qualities and to medical considerations, a fair amount of descriptive and factual information on other matters is also included. For example, in an almost wholly theoretical discussion of whether spring is hot and wet, Peter inserted the statement that seasonal differences in temperature are related to changes in the sun's apparent position, although vaporous fumes from the hidden places of the earth also play a part in making winter cold and damp.⁵⁷ His treatment of the question whether or not the equatorial regions are habitable is incisive and thorough. It includes descriptions of the latitudes of the polar regions and the tropics of Cancer and Capricorn, definitions of the terrestrial and celestial equators, an explanation of why the sun's heat is greater in the tropics, and the further information

IV-14

that day and night are always of equal length at the equator and that in India it is always summer. Despite the citation of a formidable array of authorities, including Aristotle, Ptolemy, Albategni, and Alfraganus, in favor of the view that the equatorial regions are not habitable, Peter concluded that in reality men can and do live there. He based this belief in part upon accounts by recent travelers, among them Marco Polo and John of Monte Corvino.⁵⁸ At the same time he noted that Ptolemy's opinion on the matter was ambivalent and that Haly had said the regions in question were habitable. In his enthusiasm for the equatorial regions Peter added that those who live there are all of noble disposition and are gifted with subtle memory. He believed that the fruit trees there bear abundant crops twice a year, and that the Garden of Eden probably lay along the equator. It is evident from the discussion in this differentia that Peter had studied maps; he also added an appendix on winds accompanied by a diagram, referred to in the text, showing the names of the winds from the various quarters.⁵⁹

Furthermore, in the Expositio Problematum Aristotelis, Peter described the five climatic regions identified by Ptolemy and gave an accurate account of the geography of the Black Sea, the Aegean and the Mediterranean.⁶⁰ He repeated, but apparently did not believe, a substantially correct account of the properties of the Dead Sea, probably from the De meteorologica of Albertus.⁶¹ Peter remarked, "They say (fabulantur) there is in Palestine a sea so dense that if a man bound hand and foot or an animal is thrown into it he swims on top of it and is not submerged."⁶² Peter noted from Haly that those who inhabit frigid latitudes "do not use reason,

IV-15

have corrupt and brutal faces, and eat men," and that "in the furthest north and south were the dwellings of demons and malign spirits."⁶³ He further remarked that, according to Plato, Aristotle, Ptolemy, Galen and Albertus, the men of Babylon and their neighbors, the Egyptians, excel in astronomy, mathematics, natural science and metaphysics. Avicenna is cited as the source for the belief that only men living in temperate climates are capable of intellectual advancement.⁶⁴ Also, in a passage that closely parallels a section of the De natura locorum of Albertus Magnus, Peter added that the Roman Empire lasted as long as it did because it was situated in the middle of the habitable world, and thus benefited from the intelligence of the southerners, the ferocity of the westerners, and the boldness and strength of the northerners.⁶⁵

Peter confirmed from his own first-hand knowledge the existence of pygmies, "as I have seen and touched,"⁶⁶ and he repeated from Aristotle's Historia animalium the story that the pygmies dwelt in Egypt and fought with cranes. In Peter's view they were animals not men, since they did not fully partake of reason or form a state. The question of the humanity of pygmies had been discussed by at least two earlier scholastic writers, Albertus Magnus and Petrus de Alvernia, both of whom reached similar conclusions.⁶⁷

The effect of climatic factors upon human temperament is discussed by Peter of Abano on several occasions. Peter found Avicenna's statement that the Ethiopians are timid a problem to consider; theoretically, he noted, they ought to be aggressive since they live in a hot climate.⁶⁸ The question of the life span of the

IV-16

inhabitants of hot climates, which Albertus had discussed in De natura locorum,⁶⁹ was the subject also of a lengthy disquisition by Peter. The latter noted the discrepancy between Aristotle's belief that these people were long-lived and Avicenna's contention that they grew old at thirty.⁷⁰

On the relative effect of changes of air and water, Peter rejected the opinion of Aristotle in favor of Avicenna and his own experience. According to Peter, Aristotle held that a change of water was potentially more harmful than a change of air. This, Peter pointed out, conflicted with the opinion of Avicenna, who had stated that those moving from one extreme of climate to another might experience severe ill effects, but not those moving from one neighboring province to the next. Aristotle's view was also contrary to the known fact that one could move from Picardy to Flanders, "where the water is very bad, without coming to any harm. Peter therefore concluded: "It does not seem to me that the saying of Aristotle is verified."⁷¹

In addition, Peter of Abano also devoted some attention to the phenomenon of hot mineral springs, mentioning those of his native town.⁷² In commenting on a problem or question on why stones were produced more frequently in hot than in cold water, Peter asserted that stones were formed by a process of coagulation which was especially active in hot water. In the ocean the pounding of the waves might make such stones smaller and softer, but in hot springs like those of Abano the bubbling water produced large hard stones in such number that they formed small hills.⁷³ No doubt Peter had in mind the Colle Euganei among which Abano lies; the formation of

IV-17

this group of low hills rising abruptly from the surrounding plain is striking enough to attract attention and call for explanation.

Peter reviewed and rejected three theories purporting to account for the formation of hot springs which he had found in the pseudo-Aristotelian treatise De proprietatibus elementorum. He pointed out that if hot springs were produced by the wind blowing through underground caverns, as the first theory had it, then when the wind fell the springs would get cold; furthermore, Peter added, many winds produce cold, not heat. The idea that hot springs are the result of the heat of the sun penetrating underground caves he dismissed because the temperature of the springs does not fluctuate with the season. The belief that chalky minerals produce hot springs is denied on the grounds that chalky rocks do not give off heat unless placed in a furnace. Peter stated that the water of these springs becomes hot because, as their odor proves, they run over sulphur.⁷⁴

Another Paduan writer who lived after Peter of Abano and concerned himself with the physical nature of the earth was Jacopo Dondi. He was the author of short treatises on tides and on hot springs, both relating to specific local phenomena.⁷⁵ Although his work on tides, De fluxu et refluxu maris, was apparently written about 1355, it probably incorporated ideas developed by Jacopo during his long seaside residence at Chioggia before about 1342.⁷⁶ In writing on tides, Jacopo Dondi followed an already well-established tradition, since, as has been pointed out, this phenomenon was also discussed by William of Auvergne, Robert Grossetete, Vincent of

IV-18

Beauvais, Roger Bacon, Albertus Magnus, Thomas Aquinas, Aegidius Romanus, Duns Scotus,⁷⁷ and doubtless others as well. Rather surprisingly, Peter of Abano appears virtually to have ignored the subject of tides, although he commented on a group of supposedly Aristotelian problems concerning salt water and the sea.⁷⁸ The only reference to tides by Peter that has been found is a brief citation of Albumasar as authority for the statement that the accession and recession of the sea is caused by the moon.⁷⁹ Together with the Roman naturalist Pliny, Albumasar (d. circa 886) was the chief authority on tides used by all the scholastic writers just listed.⁸⁰

Jacopo Dondi appears to have been alone among medieval writers on tides in possessing the advantage of prolonged residence by the sea, possibly for a period of some thirty years.⁸¹ According to Scardeone, the sixteenth century historian of Padua, Jacopo based his work on personal observations of the tides made at Venice,⁸² but this statement may be no more than a deduction from the fact that a considerable portion of the De fluxu et refluxu maris is devoted to a discussion of the reasons for "the movement of waters called by the Venetians 'Felle'."⁸³ Be that as it may, it is evident from the inclusion of such statements that the treatise was written with local conditions in mind, and that the author was generally familiar with the tides of the Venetian coast. Jacopo's exposition of the causes of the particular tides at Venice as well as of tides in general is, however, strictly academic, and contains no reference to any specific personal observations. He appears to have been familiar with several of the earlier writers on tides,⁸⁴ although he cites very few author-

IV-19

ities by name anywhere except in the preface, which sets forth the general premise of the work, namely that the tides, like other terrestrial phenomena, are affected by the celestial bodies, a fact that the author justified by reference to authority. To substantiate this proposition he utilized the Meteora and the De generatione animalium of Aristotle, Galen's De diebus criticis, Ptolemy's Quadripartitus, and the Liber introductorius of Albumasar.⁸⁵

Immediately after the preface, Jacopo set forth various basic propositions about tides, of which the following are a sample: (1) the sea comes forward and increases once in the day and once in the night; similarly it retreats and diminishes once in the day and once in the night; (?) the tide does not always begin to come in and go out at the same time of the day or night, but at various times; (3) there is a certain time at which both high and low tides are more extreme than at other times.⁸⁶ He then proceeded to explain his basic assumption that both the moon and the sun affected the tides in the following manner. Each day of twenty-four hours can be divided into four quarters, two occurring during the daytime and two at night. In the first daylight quarter, from dawn to noon, both the sun and the moon cause a forward movement of the waters. In the second daylight quarter, from noon to sunset, the sun and moon cause recession. Similarly, the quarter extending from sunset to midnight is a period of advance, and the quarter from midnight to dawn a period of recession. The power of the sun and moon to bring about recession of the sea is said to be at its minimum at midday and midnight; the power to cause accession is at its minimum at dawn and

IV-20

sunset. The points at which the influence of the sun and moon are at their maximum are therefore, for recession, midway between mid-day and sunset and midway between midnight and dawn; and for accession, midway between dawn and noon and midway between sunset and midnight.⁸⁷

This rigidly symmetrical formulation was used by Jacopo to explain the occurrence of two tides in every twenty-four hours, but the problem of why tides occur at different times on different days had still to be dealt with. Jacopo attributed the variations to differences in the relative positions of the sun and moon in regard to each other and discussed a number of possible conjunctions in considerable detail.⁸⁸ The so-called "aque de Fele," or Felle of the Venetians, "when the water of the sea has no definite forward or backward movement, but swirls wildly about in various ways, now forward and now back,"⁸⁹ is caused by the relative position of the sun and moon being such that they pull the waters in opposite directions with equal power. The variations in the rate at which the waters move in and out Jacopo also believed to depend upon the particular situation of the sun and the moon at any given time; the waters run fastest when the moon is either in conjunction with or opposed to the sun, that is, at full moon. Similar astronomical factors are also said to be responsible for variations in the magnitude of tides.⁹⁰

Jacopo admitted that actual tides often deviated from the scheme he had laid down. He attributed this fact to the nature of water, which is the most imperfect form of substance (entium) and therefore often deviates from its ordained motion. Tides can be either higher or lower, faster or slower,

IV-20a

than they ought to be by astronomical calculation, and they can also occur at the wrong times.⁹¹ That Jacopo was aware of discrepancies between his theory and reality is, of course, in itself an indication that he had paid some attention to the actual behavior of tides. Jacopo Dondi also knew of the variations in the length of day and night at different latitudes as well as those at different times of the year, and took into account the effect of both upon his system of dividing the twenty-four hour day into two night-time and two daytime quarters.⁹² He further stated that particularly large and bright stars, like Venus and Jupiter, might also exercise their own influence upon the tides and thus throw out calculations based on the effect of the sun and the moon. Finally, variations might be caused by changes in the weather, such as the outbreak of violent winds. Also noted was the effect of geographic factors. Jacopo declared that in narrow straits the tides tended to run faster, as could often be seen between Sicily and Calabria (i.e., in the Strait of Messina, famous since antiquity for its dangerous currents). However, he added, the presence of enclosing shores limited the total quantity of water that could pass and thus "in our Mediterranean sea," where all the water had to enter through one narrow strait, tides were lower than on the shores of the ocean.⁹³ The foregoing passage suggests not only, as has been pointed out,⁹⁴ that Jacopo believed in the circulation of the waters of the Mediterranean, but also that he did not clearly distinguish between tides and currents.

Jacopo's brief treatise on hot springs, De causa salsedinis aquarum et modo conficiendi salis ex eis was written in defense of a process he had devised for extracting salt from the

IV-21

springs of Abano. At the beginning of the work he cited the Metheora and Problemata of Aristotle and the second ten of the first book of the Canon of Avicenna in support of the contention that saline or sulphurous waters can be sufficiently purified to become potable. Salinity of water, Jacopo stated, was caused either by an admixture of salt from external sources, as when a stream flows over mineral-laden ground, or by a kind of secretion by the water itself. Here Jacopo appears to have had in mind an analogy with the secretion of saline perspiration by human beings. He added that in torrid regions the heat of the sun drew the saline vapors toward the surface of the waters. This was the reason for the difficulty of obtaining potable water in Ethiopia and southern parts of Africa. Jacopo also referred to the extraction of salt from mineral springs in Carinthia, Burgundy, and parts of Lombardy, and from the sea.⁹⁵

Apparently less interesting to Paduan scholars than the earth sciences was the topic of the natural history of animals. On the whole, references to this subject in their works are only incidental, and do not reveal either much concern or much knowledge. An exception to this generalization is perhaps Engelbert of Admont, who is known to have devoted an entire treatise to the subject of animals.⁹⁶ Like his other works, however, it was written after he left Padua and may not have been known there. Also, the Historia animalium of Aristotle is one of the very few texts that can be proved by documentary evidence to have been in the possession of a Paduan professor of arts and medicine before 1350. Peter of Abano's own copy, bearing an inscription recording its sale in Padua in 1309, is extant.⁹⁷

References to this work occur with fair frequency in the Expositio Problematum Aristotelis, among them an inaccurate citation of the eighth book as the source of the story that horses and dolphins have a particular attraction for one another.⁹⁸ No such statement appears in Aristotle's text, but the ninth book contains a description of the mutual affection of boys and dolphins.⁹⁹ Peter apparently engaged in casual, or perhaps even purposeful, observation of domestic animals, since he flatly contradicted Aristotle's statement that cows do not cough, on the basis of common experience, with the remark: "It can easily be seen that Aristotle speaks falsely in saying oxen do not cough, since we manifestly experience the contrary."¹⁰⁰

A rather low level of general knowledge about exotic animals at Padua is suggested by an exchange of verses between Mussato and Giovanni, professor of grammar, concerning a pair of lions in captivity at Venice. Giovanni solemnly inquired how it was that the lioness had borne living cubs when the authorities all stated that the lion's offspring were born dead and later restored to life. Mussato's reply declared that the event was a happy portent for Venice.¹⁰¹

The situation concerning the study of plants was very different. Since early medieval remedies largely depended upon herbal compounds, the knowledge of a fairly wide range of plants had become an essential part of the physician's professional equipment. In all probability, this knowledge might include not only the names and properties of herbs culled from Greek and Arab medical texts, but also the characteristics which would enable the physician to recognize at least some plants in practice. At Padua, the works of Dioscorides¹⁰² and Serapion,¹⁰³ the

IV-23

leading Greek and Arab authorities on herbal remedies respectively were studied.¹⁰⁴ And at the same time, compilations of herbs and herbal remedies intended to aid students were produced.¹⁰⁵ Peter of Abano edited and perhaps lectured upon the work of Dioscorides,¹⁰⁶ and Jacopo Dondi compiled the bulky Aggregator, a dictionary of references to herbs and herbal remedies drawn from the chief Greek and Arab physicians and writers on natural science. There can be very little doubt, however, that the study of plants and their medicinal properties was more closely associated with medicine than with natural science in general. For this reason, the topic of botany will be treated as a branch of medicine for the purposes of the present study.¹⁰⁷ There are, however, some references to plants in the writings of Peter of Abano which are not tied to a medical context and which therefore should be mentioned here. The Problemata Aristotelis on which Peter commented contains particulae on plants, cereals, and fruits.¹⁰⁸ Peter's exposition on some of the problems on plants included attempts to relate obscure or ambiguous plant names used in the text of the problems to known plants. For example, he observed of menta that it could have several meanings, among them Greek mint or ginger. Other plants such as thyme, he identified from Dioscorides.¹⁰⁹ In addition to Dioscorides Peter cited as authorities on plants the pseudo-Aristotelian De plantis, the De agricultura of Palladius¹¹⁰ and the Georgics of Virgil. He also included a detailed account of a method for growing extra large cucumbers or gourds, and remarked that Padua was noted for its fine melons.¹¹¹

Leaving the organic sciences, one next comes to the study of

IV-24

optics. As is well known, this subject aroused the interest of a number of learned men in the thirteenth and early fourteenth centuries, among them Robert Grossetete, Roger Bacon, John Pecham (d. 1292), and Theodoric of Fribourg (d. 1311).¹¹² However, the single most comprehensive treatise on this topic is the Perspectiva or Optics of Witelo, which was apparently written shortly after he left Padua in 1268.¹¹³ Witelo's work, which remained standard treatment of optics until the sixteenth century,¹¹⁴ consists of material drawn largely, but not exclusively, from the Thesaurus opticae of the eleventh-century Arab writer Alhazen,¹¹⁵ and rearranged to provide a systematic introduction to the subject. The work is divided into ten books, the first of which as already noted, consists of geometric theorems drawn mainly from Euclid which had to be understood before the student could proceed to master optics.¹¹⁶ The remaining books deal with light rays, the eye and how it works, optical illusions, reflections in various types of mirrors, and refraction through transparent media such as water or glass. The last book includes a lengthy disquisition on the rainbow.¹¹⁷ Witelo's optical theories have been the subject of detailed discussion by Professor A. C. Crombie and need not be enlarged upon here.¹¹⁸

Witelo's treatment of the rainbow, however, is not paralleled by anything in Alhazen, and is an original contribution to the discussion of that topic, especially as regards the role of refraction in the formation of a rainbow.¹¹⁹ He appears to have been familiar with the work of Roger Bacon on the rainbow and possibly also with that of Robert Grossetete.¹²⁰ As A. Birkenmajer has pointed out,

IV-25

there is no doubt that he was already pursuing his optical studies while at Padua.¹²¹ The fact that he completed a lengthy work on optics shortly after leaving Padua would, of course, in any case, lead one to this conclusion. It is confirmed by references in the Perspectiva to observations made at Padua: Witelo described the type of reflection seen in the exceptionally clear waters of an underground lake in a cave near Padua, and also claimed to have seen four rainbows simultaneously while resident in that city.¹²²

Dr. James Weisheipl has shown how the study of optics was, by the early fourteenth century, not just the preoccupation of a few scholars in the scientific vanguard, but was also part of the normal arts curriculum at Oxford.¹²³ Judging by the rather extensive discussion of optics inserted by Peter of Abano into the Expositio Problematum Aristotelis, a somewhat similar development appears to have occurred at Padua before 1310 when Peter's commentary was completed. It will be recalled that in the Conciliator, which is said to have been completed in 1303 but evidently contains some material of a later date inserted after his return to Italy about 1306,¹²⁴ Peter had refused to discuss geometrical optics based on the work of Alhazen (a clear reference to Witelo) on the grounds that most of his readers would be unfamiliar with the subject.¹²⁵ Either Peter designed the Expositio Problematum Aristotelis for more advanced scholars than the readers of the Conciliator,¹²⁶ or he had changed his mind about the importance of optics before completing the former work. In the Expositio Problematum Aristotelis, as in the Conciliator, Peter avoided geometrical demonstration.

The subjects of light and optics are treated by Peter of Abano

IV-26

in the form of rather lengthy digressions inserted into the commentary on almost completely unrelated problems. This is a noticeable departure from his normal practice in exposition, which was to stick fairly closely to the text of the Problemata. No doubt he seldom found it necessary to digress in order to include useful material since, as he remarked in his preface to the work, the problems of Aristotle contained something of every art and science and almost all philosophy in abbreviated form.¹²⁷ But although optical questions are scarcely discussed in the text of the Problemata,¹²⁸ Peter evidently believed it essential to give some account of this science, and therefore introduced it as best he might. Thus, for example, a question on why the voice is more audible by day than at night becomes the pretext for a lengthy discussion on light. In this Peter distinguished, as had Grossetete and other writers,¹²⁹ between lux, "that which is in a lucid body, by whose act other things are illuminated, as the sun or a candle," and lumen, "the said light received into a lucid body such as the air or water." He then proceeded to enumerate the various theories about the nature of light held by contemporary scientists, whom he did not mention by name, and by the principal older authorities. The perspectivi hold "light (lumen) to be a formal, spiritual indivisible body continuously generated," but this definition is wrong because, as Avicenna pointed out, it involves believing that two bodies can occupy the same space at the same time. "Similarly," Peter continued, "it is impossible and fabulous to say that light (lumen) is a sensible and divisible body." A preferable explanation is that light (lumen) is "an accident received in a diaphanous body," but against this must be set Aristotle's statement that light is the cause of generation and life, for an accident

IV-27

cannot be the cause of a substance. Others, according to Avicenna, say light is "clear evidence and manifestation of color, so that it is whatever color that is more developed in form and more notable than the others," but this explanation, too, Peter rejected. In his opinion, the best explanation was that light (lux) is "not firm and fixed in nature but has only an intentional form, as it is said that a species of color carried through the air to the pupil of the eye does not have material being, but a spiritual being; for this reason there can be different kinds of color in the same part, for light (lumen) generated from a lucent body is diaphanous as regards the light which is the form of that body."¹³⁰

Peter appears to have drawn upon the work of Witelo for a discussion of perspective occurring in the commentary on a problem about the inability of drunken men to see straight. In a passage that closely parallels a section of the Perspectiva,¹³¹ Peter stated:

The perspectivi say that vision is produced under acute angles; for they say that two lines are to be imagined from the thing seen constituting a direct and continuous acute angle as regards the pupil of the eye, so that an isosceles triangle is constructed whose base is in the thing seen, so that if the thing seen is large and near the eye the base will be wide . . . but if it is far away the base will appear to be smaller.¹³²

The passage just quoted displays a limited explanation of true perspective, but neither Witelo nor Peter showed knowledge of any way of working out precisely the proportions involved. Peter also appears to have taken from Witelo or Alhazen a description of the eye itself, which refers to three humors and seven tunics and identifies the cornea and the retina.¹³³

Optics appears to have received more attention than any other

IV-28

branch of physics at Padua in the thirteenth and early fourteenth centuries. There is, however, a slight possibility that Witelo may have paid some attention to mechanics while at Padua between 1262 and 1268, since he is said to have suggested the project of translating the works of Archimedes undertaken by William of Moerbeke in 1269.¹³⁴ That Witelo's interest in physics may have extended beyond the physics of light is perhaps further indicated by the fact that he apparently wrote a treatise entitled Scientia motuum caelestium.¹³⁵ But such a title could, of course, equally well refer to a purely astronomical work or, indeed, to the treatise known as De intelligentiis sometimes ascribed to Witelo,¹³⁶ which concerns the intelligences that supposedly move the celestial spheres.

A rather limited interest in mechanics was shown also by Peter of Abano, who provided a brief account of what he conceived to be the principles of motion in the Expositio Problematum Aristotelis. Like most thirteenth and early fourteenth century scholastic writers he accepted the Aristotelian concept of "natural" motion, which caused things to rise or fall to their proper place in the universe (thus, fire rises and stones fall). To natural motion he opposed violent motion, that is the impetus given to a projectile which is continuously remitted to the object thrown.¹³⁷ Peter also denied that all motion produces heat, citing cold winds as an example to the contrary, although elsewhere he rejected the view that the stars give off cold on the grounds that light and motion produce heat.¹³⁸

The earliest sign at Padua of a new interest in problems connected with motion based on a new type of text falls just outside the period of this study, strictly construed. In 1352 one Franciscus de

IV-29

Ferraria determined at Padua a question "On the proportions of motions,"
 at the request of certain scholars.¹³⁹ It has been established by
 Professor Marshall Clagett that Franciscus followed closely the con-
 clusions of the Oxford doctor Thomas Bradwardine whose Tractatus Pro-
portionum was written in 1328.¹⁴⁰ Bradwardine was, of course, a lead-
 ing member of the highly influential group of Merton masters responsible
 for the development of a mathematical approach to logic and physics in
 the first half of the fourteenth century.¹⁴¹ He is probably best
 remembered as the author of the so-called Bradwardine's law, which
 re-interpreted the Aristotelian theory of motion.¹⁴² Franciscus'
 treatise also, according to Professor Clagett, shows a knowledge of
 the work of Giovanni di Casali of Bologna, one of the first Italian
 authors known to have discussed (11346) the new English developments
 in logic and physics.¹⁴³

The opening words of Franciscus de Ferraria's treatise, which
 state that he determined the question at the request of certain schol-
 ars, appear to indicate that by 1352, some at least of the works of
 the Merton logicians and mathematicians were not only known to pro-
 fessors of arts but were discussed among students at Padua. Since,
 as just noted, the first indication that the work of Bradwardine was
 known at all south of the Alps dates from about 1346 or shortly there-
 after, it is clear that the members of the arts faculty at Padua kept
 well abreast of the academic trends of the day in their teaching. No
 reference in any source associated with Padua before 1350 has, however,
 been found to the important writings on dynamics of Jean Buridan, who
 was rector of the University of Paris in the third and fourth decades
 of the fourteenth century.¹⁴⁴

IV-30

Such, then, were the branches of natural science studied at Padua in the thirteenth and first half of the fourteenth centuries. All of them, as remarked at the beginning of this chapter, were in medieval educational theory intimately associated with the divine science, or first philosophy, of metaphysics. As the late Stephen d'Irsay pointed out, the natural sciences entered the curriculum of the thirteenth century schools as part of an indivisible philosophia naturalis, and cannot be considered apart from philosophy.¹⁴⁵ One may safely assume, therefore, that metaphysics played a part in the course of studies available at Padua before 1350, but the extent of that part remains to be determined.

Until the foundation of the faculty of theology in 1363,¹⁴⁶ the only source of public teaching on metaphysics at Padua was the faculty of arts. One might suppose that the absence of a faculty of theology, suspicious of possibly heterodox tendencies in Aristotelian philosophy,¹⁴⁷ would have encouraged the intensive pursuit of metaphysical speculation in the faculty of arts. But at Padua in the period with which the present study is concerned, metaphysics appears to have received relatively little emphasis. An important exception to this generalization is, of course, the work of Peter of Abano. Apparently he alone, among masters teaching at Padua before 1350, devoted considerable attention in his writings to fundamental problems associated with metaphysics, that is to cosmology, ontology and psychology. William of Brescia and Peter of Abano seem to be the only professors described in contemporary sources as teaching philosophy,¹⁴⁸ a term which in any case, as already

IV-31 noted, might include but was not coterminous with metaphysics.¹⁴⁹

There is, however, no doubt that the standard Aristotelian philosophical texts, that is, the Physics and the Metaphysics, the De anima and the De caelo et mundo were in use at Padua by the beginning of the fourteenth century, since all four were among the sources drawn upon by Geremia da Montagnone in compiling his florilegium. Geremia also made use of the De Generatione et corruptione in the Latin version of Grosseteste as revised by William of Moerbeke, and the Nicomachean Ethics in the version of William of Moerbeke.¹⁵⁰

The relative lack of emphasis on metaphysical questions in the writings, and hence in all probability in the teaching, of most Paduan masters before 1350 may perhaps be related to the fact that the teaching of metaphysics appears to have been in the hands of doctors whose chief interest was often in medicine. Hence, as noted at the beginning of this chapter, when Rolandino listed the Paduan professors of arts and the subjects they taught in 1202, he did not mention either "philosophy" or "metaphysics" at all. His description probably implies that the teaching of this subject was generally the responsibility of professors of medicine and natural science.¹⁵¹ Although metaphysics was certainly thought to be a necessary part of the training in arts given to future physicians,¹⁵² it is conceivable that this subject may have been somewhat neglected by teachers whose orientation was primarily toward medicine and medical practice.

In the period under discussion, in short, the schools of Padua were not yet the noted center of Aristotelian philosophy that they were later to become. The works of Aristotle were certainly studied, but probably as a guide primarily to logic and natural science. In

IV-32

the fields of medicine, astronomy, and natural science, Peter of Abano appears as one link in an already established and continuing Paduan tradition; in the extent and quality of his writing on metaphysics, he seems to have neither predecessors nor immediate followers at Padua. In the thirteenth century, the only author connected with Padua who was known to have written upon metaphysical topics appears to have been Witelo, who may, as already stated, have been the author of a neo-Platonic work on the hierarchy of intelligences.¹⁵³ Whether the De intelligentiis is properly attributed to him or not, Witelo's optical researches were clearly inspired by neo-Platonic light metaphysics as the dedicatory letter prefaced to the Perspectiva shows. In it Witelo stated that all things are ordered by means of the divine light and that corporeal light is the diffusion of the supreme corporeal forms in nature, applying itself to inferior bodies.¹⁵⁴ It is to be presumed that Witelo's neo-Platonic ideas were known at Padua during the period in which he studied there, but there does not appear to be any evidence to suggest that he attracted any followers for this aspect of his teaching. Peter of Abano's discussion of material drawn from Witelo adheres pretty closely to the natural scientific aspects of optics.

For lack of other sources, therefore, it is still necessary to depend chiefly upon the works of Peter of Abano, atypical though they may be, to get an idea of the content of metaphysical or philosophical teaching at Padua before 1350. But any attempt to discuss Peter's philosophical doctrines is necessarily bedevilled by the controversy about the origins of the so-called Paduan Averroism.¹⁵⁵ This controversy first arose because the reputation of Peter of Abano for

IV-33

heterodoxy and the prevalence of radical Aristotelianism in the Paduan schools in the fifteenth and sixteenth centuries led some nineteenth and early twentieth century scholars, notably Ernest Renan and Peter's biographer Sante Ferrari, to postulate a direct link between the two phenomena. They nominated Peter as the founder and propagator of a continuous tradition of "Averroism" at Padua. This finding has been disputed by more recent scholars. The late Professor Bruno Nardi questioned whether Peter himself ever expressed clearly heterodox opinions, pointing out that to review a theory is not necessarily to endorse it.¹⁵⁶ The late Professor Lynn Thorndike showed that most of the stories of Peter's difficulties with the Inquisition are of dubious authority and of late date, that his beliefs can be associated with Arab writers other than Averroes, and that, in any case, his extreme astrological determinism was just as likely to have been grounds for ecclesiastical censure as either sorcery or Averroistic tendencies.¹⁵⁷ Most recently, Professor P. O. Kristeller has shown that Petrarch's De sui ipsius et multorum ignorantia, written between 1368 and 1370, a work formerly thought to be aimed at Paduan Averroists and thus to provide definite evidence for the continuation of a Paduan Averroist school throughout the fourteenth century, was in fact directed against Aristotelianism at Bologna.¹⁵⁸

The interest in Peter of Abano's supposed Averroism has ensured that the metaphysical elements in his work have attracted a good deal of scholarly attention. It would be superfluous to repeat here a detailed account of the material brought together by the writers named in the preceding paragraph. Nevertheless, for the sake of completeness, a brief summary of Peter's ideas may be supplied. The chief

IV-34

passages of metaphysical speculation in the writings of Peter of Abano are those on the origin of the world, of species and of the human soul. In general the principal authorities referred to by Peter in connection with these topics are Aristotle, Galen, Averroes and Avicenna.

The origin of the world and of species is the subject of two passages in the Expositio Problematum Aristotelis. In commenting on a problem on the generation of animals, Peter stated that Aristotle poses the question "What is the cause of generation which existed from the beginning with those things that were generated when the world was generated."¹⁵⁹ He then went on to review various theories concerning this topic. He cited the opinions of Plato in the Timaeus, and Aristotle in the eighth book of the Physics, but appears to have preferred the hypothesis of Empedocles, which accounted for change and motion in the universe in terms of the perpetual alteration of Strife and Love. Here below, Peter remarked, matter always exists in a state of transmutation; terrestrial movement is also accounted for by the movement of the eighth sphere. Peter continued:

It does not appear to us therefore that generation and the world did not begin but existed from eternity as is proved in the eighth book of the Physics. This is not compatible with the truth of the orthodox faith. . . . Many who think the world had a beginning postulate that everything was generated from matter through putrefaction by the help of higher bodies . . . and this could well be.¹⁶⁰

By this Peter apparently meant that various species of animals could be produced by the action of the stars either upon putrefying matter to produce spontaneous generation or upon the normal reproductive processes.

IV-35

The movements of the heavenly bodies are powerful enough to ensure that semen makes something out of whatever happens to be its subject. This is afterward given a specific form by the virtue of the stars, namely the specific form of its species, and with these the whole world is full.¹⁶¹

He then proceeded to note that mice and snakes are (or perhaps were) first produced by spontaneous generation and afterwards were multiplied by sexual reproduction. There follows an account of the divergent views of Avicenna, who held that the influence of the stars upon generation was sufficient to account for all terrestrial species, and of Averroes who believed that the complex higher animals could not be produced in this way. Peter came down firmly on the side of Averroes. As for man, Peter declared: "It is apparent that [the virtue of the stars] is not sufficient as regards man, since his soul is not brought forth from the potency of matter, but is given by the first giver, as the philosophers say."¹⁶²

Elsewhere in the Expositio Problematum Aristotelis Peter of Abano appeared to accept the existence of some form of cyclical process in the universe for he wrote: "When anything becomes old and reaches the end through corruption it reverts again to the beginning, that is to the beginnings of generation as in elements and matter." This cycle Peter related to the circular motion of the heavens, which he held to be "the cause of all generated and corruptible things. For the continual motion of this world here below is governed with the help of higher bodies."¹⁶³

The main difficulty in the passages quoted in the foregoing paragraphs is that Peter did not indicate at all clearly which of the various theories described had his own support. He may have been

IV-36

deliberately cautious, in view of the potentially subversive nature of some of the material in the eyes of the ecclesiastical authorities. The citation of Averroes against the possibility of a material origin for the human soul, might lead one to suspect that Peter subscribed to the unicity of the possible intellect. In fact, however, it is likely that this citation was inserted simply in order to strengthen Peter's repudiation of materialism as regards the soul, which, by his own account, the Dominicans of Paris had falsely accused him of holding.¹⁶⁴ According to Professor Bruno Nardi, who first drew attention to the passage of the Conciliator in which Peter related his difficulties with the Dominican inquisitors, Peter held that life was produced by a virtus informativa, which was a form of stellar influence exercised through the paternal seed, but he did not equate virtus informativa with the rational soul.¹⁶⁵ Nardi's conclusion would certainly appear to be supported by the passage of the Expositio Problematum Aristotelis quoted above. In the Conciliator Peter specifically stated that the rational soul comes from God.¹⁶⁶ He also held, according to Nardi, that the soul is the individual and unique form of each human being. He appears, however, to have denied direct divine intervention in the normal course of events on earth, holding that causation in the sublunary world, while ultimately dependent upon the prime mover, was carried out through intermediaries and that these intermediaries were the stars.¹⁶⁷ Indeed the fact that he chose to comment on the Problemata Aristotelis, a collection of questions predicated on the belief that separate, distinct and rationally knowable physical secondary causes produce the multifarious phenomena of the world of sense is in itself evidence for his preference for the

IV-27

empiricism of natural science to either theological or mathematical universalism and absolutism. Before leaving the philosophical ideas of Peter of Abano, it may be noted in at least one important respect he was diametrically opposed to Averroes. In the thirteenth century Averroism was identified with acceptance of the Aristotelian cosmology, and rejection of Ptolemaic astronomy;¹⁶⁸ but, as shown above,¹⁶⁹ Peter was a convinced adherent of the Ptolemaic theory and rejected the Aristotelian version out of hand.

The source of Peter of Abano's philosophical teaching was presumably Paris, where he spent a number of years before returning to Padua. But Paris was not the only, nor even the most, probable source from which radical Aristotelian ideas could reach Padua. Recent studies have revealed intensive interest in metaphysical problems and radical Aristotelian concepts about the nature of the universe among physicians and masters of arts at Bologna in the late thirteenth and first half of the fourteenth century.¹⁷⁰ Bologna is certainly much nearer and more accessible to Padua than is Paris, and the intellectual relations between the two Italian university centers seem in general to have been fairly close.¹⁷¹ A specific point of contact can be found through the celebrated physician Taddeo Alderotti, who is said to have been greatly interested in Aristotelian philosophy and to have translated the Nichomachean Ethics from Latin into Italian.¹⁷² Taddeo was the master and uncle of Dino del Garbo, who in turn became one of the most distinguished and influential medical writers and practicing physicians of his age. Dino taught medicine at Padua briefly in 1311-1312, and his voluminous works were no doubt

IV-38

in use there for a much longer period.¹⁷³

Dino del Garbo quite frequently introduced metaphysical and philosophical considerations into his medical works. For present purposes, a single example of his technique will suffice; it may be drawn from the rather lengthy introduction Dino prefaced to his commentary on the treatise of Hippocrates On the Nature of the Fetus.¹⁷⁴ Dino was evidently fully aware of the philosophical implications inherent in considering the origin of individual human beings, and discussed the matter with the aid of citations from the Metaphysics, De anima, De celo et mundo and the commentaries of Averroes on these works. He placed his subject squarely in the context of natural philosophy, pointing out that knowledge of the causes or origins of the objects with which any science concerned itself was an important part of that science. In the treatise presently under consideration Hippocrates dealt with the causes and origins of human bodies; for while the natural philosopher investigates the principles of generation of all kinds of animals, the physician confines himself to the human body.¹⁷⁵

After a few comments on the lack of organization in Hippocrates' work, a disorder which he held should be forgiven in the founder of a science, Dino passed on to consider the physical nature of conception. Using a mixture of logical analysis and observation, he proved that semen with the power to conceive was produced by the male only and not by both male and female, as Aristotle and Avicenna had held. He also remarked in passing that parthenogenesis was impossible. Dino then proceeded to expound the belief that the heart was generated before the spiritus, noting that Averroes had said that man's physical parts

IV-39

constituted matter, while his spiritus was form. Conceding that, as Avicenna said, nature always begins with easier things, Dino denied "that it is easier for nature to make the spirit, which is the instrument of the soul, than the heart, although if the spirit were nothing more than some kind of well-tempered vapor, that might well be true."¹⁷⁶ He apparently considered that part, at least, of the spiritus was transmitted from the male parent, through the action of a virtus informativa spermatis.¹⁷⁷ Perhaps the most interesting feature of the discussion just outlined is the way in which it carefully skirts the question of the origin of the rational soul. It may be, of course, that Dino simply felt that this question had no place in a medical text.

Thus, since the works of Dino del Garbo, of which the foregoing is a sample, were undoubtedly studied at Padua, there is no reason to suppose that the Paduan schools were cut off from the metaphysical speculations current at Bologna in the early fourteenth century.¹⁷⁸

FOOTNOTES TO CHAPTER IV

1. "Naturalis quoque scientia necessarius est scientia. . . ." Amalricus, Diff. I, fol. 2r.

2. "Metaphysica quoque . . . est necessaria, et essentialis scientia principiorum scientiarum principum" (ibid.).

3. For a general account of the concept of a quadrivium in the schools of western Europe in the twelfth and thirteenth centuries, see J. Knowles, The Evolution of Medieval Thought (New York: Vintage Books, 1962) and E. van Steenbergen, Aristotle in the West (Dordrecht: Reidel, 1967). In the twelfth century natural philosophy was categorized as part of the quadrivium (ibid. naturalis scientia) but by the thirteenth century it had become a separate discipline (ibid. naturalis scientia). The passage is cited in Amalricus, Diff. I, fol. 2r. For a detailed presentation of these works.

4. Thomas Aquinas, The Division and Method of the Sciences, Questions V and VI of his Commentary on the De Trinitate of Boethius, ed. and trans. G. Maurer (Toronto: The Pontifical Institute of Medieval Studies, 1963), pp. 10, 11. The passage is cited in Kibre, "The quadrivium in the Thirteenth-Century Universities," p. 136.

5. Aquinas, The Division and Method of the Sciences, p. 10, where it is further remarked that mathematics should be studied before natural science, since mathematics can easily be absorbed by the young, whereas natural science requires a more mature mind. As Professor Kibre has pointed out, St. Thomas by no means denied the place of mathematics in

education, but it was for him only one third of speculative philosophy ("The Quadrivium in the Thirteenth Century Universities," pp. 180-181). On the classification of the sciences, see also J. A. Weisheipl, "Classification of the sciences in medieval thought," Medieval Studies, XXVII (1965), 54-90.

6. See J. Gagne "Du Quadrivium aux Scientiae Mediae," Actes du Quatrième Congrès International de Philosophie Médiévale, pp. 975-986. According to this author St. Thomas may have been the first to use the term scientiae mediae, although the meaning of natural science and its relation to the mathematical sciences had been discussed by Avicenna.

7. The statutes of the student university of arts and medicine of Bologna compiled in 1405 list all or part of the following works of Aristotle as required reading in "philosophy": Libri physicorum, De generatione et corruptione, De sompno et vigilia, Phisionomia, De celo et mundo, Libri meteorologicorum, De sense et sensato, De substantia orbis (perhaps this refers to De mundo, according to the editor of the statutes), De memoria et reminiscencia, De inspiratione, De respiratione, De morte et vita, De anima ("except for the errors of the first book"), Metaphysice, De longitudine et brevitate vite and De causa motus animalium (Malagola, Statuti delle Università dello Studio Bolognese, p. 274).

No commentaries or secondary works are mentioned in the statute, but this does not, of course, mean that they were not used in teaching.

According to the editors of the Aristoteles Latinus, the Aristotelian works in natural philosophy can be divided into the corpus vetustius, in general use in the schools in the mid-thirteenth century,

and the corpus recentius introduced by the end of the thirteenth century. The former included the Physice, De generatione et corruptione, De anima, some of the so-called Parva naturalia (De sensu et sensato, De memoria et reminiscentia, De somno et vigilia), De celo, part of the Meteora or Meteorologicorum together with the pseudo-Aristotelian De plantis and De causis and the older version of the Metaphysice. The latter comprised the complete Meteora, the Historia animalium, additions to the Parva naturalia, among them De juventute et senectute, De respiratione and De morte et vita, the Phisionomia, De coloribus and the pseudo-Aristotelian De nilo, De lineis, De proprietatibus elementorum and De mundo, as well as new translations from the Greek of most of the major works (Aristoteles latinus, ed. G. Iacombe, Union Académique Internationale: Corpus Philosophorum Medii Aevi, I [Rome, 1939; Bruges, 1957], 50).

8. De intelligentiis (text at pp. 1-72 of C. Baeumker, "Witelo ein Philosoph und Naturforscher des XIII Jahrhunderts," Beiträge zur Geschichte der Philosophie des Mittelalters, III, Part 2 (Münster, 1908), p. 1. Baeumker attributed De intelligentiis to Witelo on the basis of style and subject matter, but the attribution has been questioned (see Sarton, Introduction to the History of Science, II, Part 2, 1027).

9. Fowler, The Intellectual Interests of Engelbert of Admont, p. 20, quoting Engelbert's letter to master Ulrich.

10. Weiss, Il primo secolo dell'umanesimo, p. 34, where it is pointed out that Geremia habitually made use of the most recent versions of Aristotelian works, especially those of William of Moerbeke (d. 1286). For Geremia and his work, see pp. 55-66.

F-IV-4

11. Conciliator, Diff. 1, fol. 3r: "lecturus . . . librorum necesse est," apparently a citation from the Colliget of Averroes. It appears to refer to De sensu et sensato and the "libris animalium" which are mentioned in the preceding sentence in connection with the desirability of the study of natural science by medical students, but may refer to books about natural science in general.

12. For example, from the library of the convent of S. Giovanni di Verdara in Padua, a fourteenth century copy of De celo, De generatione et corruptione and the Physica in the twelfth century translation of Gerard of Cremona and a thirteenth century copy of the Physica in the new translation (Nos. 66 and 73 in Manoscritti e stampe Venete dell'Aristotelismo e Averroismo: Catalogo). The library of S. Giovanni di Verdara was formed in the fifteenth century. See P. Sambin, "La formazione quattrocentesca della biblioteca di S. Giovanni di Verdara in Padova," Atti dell'Istituto Veneto di Scienze, Lettere ed Arti, cl. di scienze morali e lettere, CXIV (1956), 263-280. From the Eremitani (that is, the convent of Augustinian hermits in Padua) comes a fourteenth century manuscript of the Physica and De celo in the new translation and a copy of the Problemata written in 1293, both now in Biblioteca Universitaria, Padua (Nos. 67 and 80 in the Manoscritti e stampe Venete dell'Aristotelismo e Averroismo: Catalogo). A copy of the Historia Animalium in the translation of William of Moerbeke bearing an inscription stating that it was purchased from Peter of Abano at Padua in 1309 is in the possession of the Biblioteca Malatestiana at Cesena, cod. Plant. VII, Sin. 3, no. 79 in Manoscritti e stampe Venete dell'Aristotelismo e Averroismo: Catalogo. The

F-IV-5

Franciscans of Padua possessed before 1396 certainly two and perhaps three manuscripts of the Physica, one bound together with De anima, De memoria et reminiscentia, De differentia spiritus et anime, De morte et vita, De sensu et sensato, De sompno et vigilia and the Meteora. (Humphreys, The Library of the Franciscans of the Convent of St. Antony, no. 390, 391, 414. No. 391 is apparently the same as No. 428 in A. M. Iosa, I Codici Manoscritti della Biblioteca Antoniana di Padova [Padua, 1886]. In Antoniana 428, the pages containing the Physica are covered with a voluminous marginal gloss and worn from much handling; the other treatises, by comparison, seem almost untouched.) Also, before 1396, the Franciscans at Padua owned a copy of Bartholomew of Messina's translation of the Problemata Aristotelis, the work on which Peter of Abano commented (Humphrey's no. 201, Iosa, no. 370). They also had a copy of the questions of Duns Scotus upon the Metaphysica (Humphrey's, The Library of the Franciscans of the Convent of St. Antony, no. 203).

13. A thirteenth century manuscript of questions on De anima, now in the Biblioteca Marciana, contains a reference to a fasting girl at Padua (fol. 13). The commentary is ascribed to Albertus, but according to Valentinelli, this is not Albertus Magnus (Valentinelli, Biblioteca Manuscripta ad S. Marci, IV, 48, Cod. 63, 13c [Lat. VI, 14]). Can it perhaps be associated with Alberto degli Anselmi da Palazzolo who taught medicine at Padua between 1273 and 1317 (Gloria, Monumenti, 1222-1318, pp. 351-352)?

14. Fowler, The Intellectual Interests of Engelbert of Admont, p. 58.

15. See above, pp. 75-76.

16. For Aegidius' philosophical works, see Histoire Littéraire, III (1888), 455-474 and p. 443, where it is pointed out that these commentaries date from the early part of the author's career, when he was a lecturer in the faculty of arts at Paris.

17. "Erant quoque tunc temporis regentes in Padua viri venerabiles: Magister Agnus, magister Iohannes, magister Zamboninus, profundi et periti doctores in phisica et sciencia naturalis. . . ." (Rolandino, Cronica). A magister Agnellus, who is presumably to be identified with the Agnus mentioned by Rolandino is described in a notarial document of June 25, 1261 as "naturalis et phisicalis scientiae professor (Gloria, Monumenti, 1222-1318, documents, p. 21).

18. See chapter III.

19. See above, p. 70.

20. By Engelbert of Admont (ibid).

21. See pp. . . . , 227.

22. "De fascinations," Klosterneuberg 306, fol. 176r. Attention is drawn to the episode and the passage is quoted in Thorndike, History of Magic, III, 436-437.

23. In his will; see above, p. 73, note 137.

24. See note 7 above.

F-IV-7

25. See above, p. 115 note 10.

26. For their careers at Padua see above, pp. 70, 97-99; 119-120.

27. A bibliography of Engelbert's writings is published in Fowler, The Intellectual Interests of Engelbert of Admont, pp. 183-221, and supplemented in the same author's "Manuscripts of the writings of Engelbert of Admont," Osiris, XI (1954), 455-485. The two Aristotelian commentaries are known only through Engelbert's own account of his writings contained in his letter to Master Ulrich, printed in B. Pez, Thesaurus Anecdotorum Novissimus, I, Part 1, cols. 428-436 and cited by Fowler. The treatise De causa et signa mutationis aeris et temporum survives in one known manuscript (Admont 392, ca. 1380, TK 1209). Engelbert's De natura animalium is found in two manuscripts (Admont, cod. 119, fols. 29r-47r and Admont cod. 547, fols. 82r-120v). I have not seen these manuscripts. Engelbert's work on the topic of fascination (Klosterneuberg Cod. 306 (9), fols. 164v-179r, no. 144 in the Thorndike collection of rotographs at Columbia University Library) should perhaps be added to the category of his natural scientific writings.

28. See note, p. 167, above, and pp. 231-238.

29. See pp. 218-223.

30. See Randall, "The Development of Scientific Method in the School of Padua," pp. 185-189.

31. Jacopo's De fluxu et refluxu maris is printed, together with an Italian translation and lengthy introduction, in Paolo Revelli, "Il

F-IV-8

trattato della marea di Jacopo Dondi," Rivista Geografica Italiana, XIX (1912), 200-282. The Latin text is at pages 238-254. According to Revelli (p. 203) this work was previously printed in Venice in 1559. His Tractatus de causa salsedinis aquarum et modo conficiendi salis ex eis appears in De Balneis omnia quas extant apud Graecos, Latinos, et Arabos . . ., Venice 1553 at fol. 109r-v. I have consulted the copy at the New York Academy of Medicine.

32. Albertus Magnus' complete works are edited in B. Borgnet, B. Alberti Magni . . . Omnia Opera (38 vols., Paris, 1890-1899). They include treatises on meteorology, minerology, geography, botany, and other natural scientific topics, mostly in the form of Aristotelian commentaries: a modern, critical edition of Albertus' works is in the course of publication, Albertus Magnus, Opera Omnia, ed. Institutum Alberti Magni Coloniense, Bernardo Geyer praeside, Monasterii Westfalorum, Ascendorff, n.d. For Albertus as a scientist, see, inter alia, Thorndike, History of Magic and Experimental Science, II, 517-592.

33. The sources and reliability of this tradition are discussed in detail in Franz Pelster, S. J. "Kritisch Studien zum Leben und zu den Schriften Alberts des Grossen," Ergänzungshefte zu den Stimmen der Zeit, IV (Freiburg im Breisgau, 1920), 58-59. According to this monograph, definite statements that Albertus studied at Padua and was received into the Dominican order there are first found in fourteenth century sources.

-IV-

However, the Vitae Fratrum Ordinis Praedicatorum of Gerard of Fracheto (d. 1271) refers to "frater quidem vir fame eximie, excellentis status in ordine, cum ad huc iuveneculus studeret Padue" (Gerard of Fracheto, Vitae Fratrum, ed. B. M. Reichert [Louvain, 1896], p. 117); in one manuscript of this work only, the personage in question is identified as Albertus. According to H. C. Scheeben, "Albert der Grosse: Zur Chronologie seines Lebens," Quellen und Forschungen zur Geschichte des Dominikaner Ordens in Deutschland, XXVII (1911), 1 ff., the statement of Gerard of Fracheto and the general strength of the tradition concerning Albertus' studies at Padua make it probable that the story is founded in fact.

34. See above, pp. 7-8.

35. Somewhat extravagant claims for Albertus' studies and academic position in Padua were made by A. Gloria, according to whom Albertus taught theology at the Dominican convent and studied arts and medicine in the schools (A. Gloria, "Quot annos et in quibus Italiae urbibus Albertus Magnus moratus sit," Atti del R. Istituto Veneto di Scienze, Lettere, ed. Arti, Series 5, VI [1879-1880], 1024-1050.) Pelster, "Kritisch Studien," pp. 58-59, Scheeben, "Albert der Grosse," p. 9, and Denifle, Die Entstehung, p. 280, unite to point out the total absence of definite evidence of any kind concerning the nature of any studies Albertus may have undertaken at Padua.

36. For a summary of this dispute see Pelster, "Kritisch Studien," pp. 34-50. The traditional birthdate of Albertus is 1193, but Mandonnet and some other scholars suggested that it should be advanced to about 1206.

F-IV-10

The question has not been finally resolved; Pelster prefers the earlier date.

37. For example, A. Birkenmajer, who wrote "Che Alberto Magno non studia mai a Padova e oggi una cosa generalmente riconosciuta" ("Witelo e lo Studio di Padova," p. 159). The well known remark of Roger Bacon to the effect that an unnamed member of the Order of Preachers who is probably to be identified with Albertus had never either lectured upon or studied philosophy in the schools (Roger Bacon, Opus Maius in Opera quaedam hactenus inedita [London, 1859, I, 327] quoted in J. A. Endres, "Das Geburtsjahr und die Chronologie in der ersten Lebenshälfte Alberts des Grossen," Historisches Jahrbuch, XXXI [1910], 296), may or may not be founded on fact.

38. Meteor. 3.2.12, Borgnet, IV, 620; Mineral. 2.3.1, Borgnet, V, 48. Both these references were pointed out by Professor Lynn Thorndike (History of Magic and Experimental Science, II, 523). Albertus referred to Padua in his geographical work, De natura locorum, in which he wrote of "Patavium, quae nunc Padua vocatur civitas in qua floruit studium ante parvum tempus" (De natura locorum [Vienna, 1514]), 3.2., sig. K3; I have consulted the photocopy of this edition in the New York Public Library). According to F. Pelster, De natura locorum was probably written soon after 1248 ("Kritisch Studien," pp. 139, 161); the wording used by Albertus presumably implies that the studium was not flourishing at the time of writing.

39. There appears to be no evidence of any corporation of scholars of arts at Padua at so early a date. Whether or not the artists could enroll in the jurist associations is not clear. In view of the later

F-IV-11

subordination of the university of arts to the jurist universities, it seems unlikely that the artists enjoyed full membership of the jurist associations in the 1220s (see Chapter I, above).

40. According to Helster ("Kritisches Studien," p. 139), the works on natural science of Albertus Magnus may have begun to be written about 1240, De natura locorum being one of the first to be composed.

41. See p. 233.

42. See above, p. 8.

43. Engelbert appears to have joined the Benedictines of Admont in about 1297 (Fowler, The Intellectual Interests of Engelbert of Admont, p. 14). According to A. Birkenmajer ("Witelo e lo Studio di Padova," p. 157), Witelo is to be identified with a chaplain of King Ottokar of Bohemia.

44. See bibliography of Engelbert's writings in Fowler, The Intellectual Interests of Engelbert of Admont, pp. 183-221.

45. Birkenmajer, "Witelo e lo Studio di Padova," pp. 149, 160.

46. This statement is not, of course, intended to minimize the importance of Peter's travels or of his sojourn at Paris. Clearly, Peter of Abano was a major channel for the transmission of Parisian teaching to northern Italy.

47. See p. 240.

48. See above, pp. 210-211.

49. See note 27.

50. Fowler, The Intellectual Interests of Engelbert of Admont, p. 58, where a date between 1287 and 1300 is suggested.

51. Conciliator, Diff. 12) An terra sit frigidorum primum aut aqua, 13) An aqua sit humidorum primum aut aer, 14) An aer sit natura calidus vel frigidus, 66) An ver sit temperatum, 67) An sub equatore sit possibilis habitatio, 114) An aer magis immutet quam potus vel cibus, 115) An autumnus magis abbreviatur vita vel aliis temporibus anni. Some of these titles are noted in Thorndike, History of Magic and Experimental Science, II, 886-887.

52. Expositio Problematum Aristotelis, Particulae 14) Complexiones, 23 Salsa aqua et mare, 25) Aer, 26) Ventī.

53. The Quadripartitum or Tetrabiblos was translated into Latin before 1150 and printed in two early editions (Venice, 1484, 1494, Klebs 814.1-2), Book 1 describes conditions in various countries. The value of this work, much used by medieval astrologers, has been defended in O. E. Neugebauer, "Exact Science in Antiquity," Robert M. Palter, ed. Toward Modern Science (New York: E. P. Dutton, 1969), pp. 15-24 at pp. 16-17. This essay originally appeared in University of Pennsylvania Bicentennial Conference: Studies in Civilization (Philadelphia: University of Pennsylvania Press, 1941). Haly Rodan ('Alī ibn Ridwān), d. Cairo 1061 or 1067, was the author of numerous astrological and medical treatises. His commentary on the Quadripartitum is printed with the editions of that work published in Venice in 1484 and 1494.

F-V-17

54. The contribution to geography of Albertus Magnus is discussed in Ida Gobbo (Suor Giordana, O. P.), "Il pensiero geografico di S. Alberto Magno," Scritti Vari, Università degli Studi di Torino, Facoltà di Magistero, I (1950), 295-377.

55. Airs Waters Places in Hippocrates [Works], trans. W. H. S. Jones (Loeb Classical Library [London: William Heinemann, Ltd., 1923, reprinted 1962]), I, 71-137. On the use of this work in the Middle Ages, see Kibre, "Hippocratic Writings in the Middle Ages," pp. 393-394.

56. De natura locorum, l.11, sig. F2r.

57. "Sol cum pervenit circa equalitatis lineam sui effectiva caliditate aerem reddit calidum et calefaciendo humidatatem superfluum evaporans facit hyemis. . . . Cum vero sol circa principium pervenit canceri: amplius calefaciens materia per disposita: exiecat (sic) ideo ut tempus calidum id reddatur et siccum quod est estatis. . . ." (Conciliator, Diff. 66, f. 96r). There follows the reference to "fumi vaporosi ex occultis terre."

58. Marco Polo's account of his travels was dictated in a Genoese prison in 1296, and Peter may have obtained his information from the written version. However, if Peter met Marco Polo in person, as the phraseology of the Conciliator would appear to indicate ("De ipsa quoque cum aliis mihi rettulit Marcus Venetus . . ." fol. 97v) it was probably after Peter's return to Italy in about 1306. Marco Polo was absent from Venice on his travels from 1269 until 1295, and in prison in Genoa from 1296-1299. In 1295, as already noted, Peter was in Paris, and apparently remained there for some years after that date

r-IV-14

(see Thorndike, History of Magic and Experimental Science, II, 877-879).

The passage is therefore fairly clear evidence that parts of the Conciliator were written after Peter's return to Padua and after the supposed date of completion in 1308 (see above, p. 107, n. 136). Of course, the possibility that Peter may have paid a brief and unrecorded visit to his homeland while still teaching at Paris cannot be altogether discounted.

John of Mont-Corvin was a Franciscan missionary to India and China in the years ca. 1290-1328. His letter of about 1291 describing the Coromandel coast is the first Latin Christian account of India. It is to be found in "Primo sinarum apostolo et archiepiscopo Ioanni a Monte Corvino sexcentesimo exeunte ab eius obitu reverenter dictata." Acta Ordinis Fratrum Minorum, XLVII (1920), 174-211 (See Barton, Introduction to the History of Science, II, Part 2, 1054-1056).

59. Conciliator, Diff. 67, fols. 64v-100r.

60. Expositio Problematum Aristotelis, 19.1; 23.6.

61. Meteor., 2.3.16, Borgnet IV, 579-580, cited in Gobbo, "Il pensiero geografico di S. Alberto Magno," pp. 337-338. Albertus' account is superior to that given by Peter. The former but not the latter author called the Dead Sea by name (mare mortuum) and attributed its characteristics specifically to its salinity.

62. "Quidam fabulantur in palestina esse aquam maris adeo spissam quod si homo colligatus manibus et pedibus aut bestia prohibeatur in eam supernatat super eam et non submergitur" (Expositio Problematum Aristotelis, 23.14).

F-IV-15

63. "non uidentes rationes et facies corruptas turpes et brutales habentes homines commendentes. . . ." (ibid., 14.15).

64. Ibid., 14.15.

65. De Natura Locorum, 2.3, sig. I, 1r, Expositio Problematum Aristotelis, 14.15.

66. "Sicut vidi et tetigi," (Expositio Problematum Aristotelis, 10.12).

67. For Albertus' treatment of the subject, see Gobbo, "Il pensiero geografico di S. Alberto Magno," p. 375. On the treatment of the topic by Petrus de Alvernia, see J. Koch, "'Sind Pygmaen Menschen?' Ein Kapitel aus der mittelalterlichen Scholastik," Archiv für Geschichte der Philosophie, XL (1931), 194-213. Petrus de Alvernia, a pupil of Thomas Aquinas, debated the question in a quodlibetal disputation at Paris in 1301; his treatment of the topic, printed by Koch at pp. 209-213, was so closely followed by Peter of Abano that it seems likely the latter may have been present at the disputation.

68. Expositio Problematum Aristotelis, 14.8.

69. De Natura Locorum, 2.3, sig. h4r.

70. Expositio Problematum Aristotelis, 14.9, 10.

71. "sicut apparet cum quis ex pichardia se transferret in Flandria

F-IV-16

ubi pessime sunt aquae et hoc non videtur mihi quod sermo verificatur Aristotelis (ibid., 1.13).

72. Abano, near Padua, is noted for its thermal springs, which are said to have therapeutic value. The town is today a fair-sized resort and spa.

73. "et lapides maiores et duriores a lesione pedis appellati generari ex calidis aquis sicut ex fonte antenorio apud dicto: ex quo existit oriundus contingit ex aqua ferventissimo lapides generari subalbidos asperos et porosos quorum iam multitudo tanta extat ut collis consurgat inde brevis" (ibid., 24.11).

74. Ibid., 24.19. According to Professor A. C. Crombie, Aristotle and Albertus Magnus had offered a similar explanation of the same phenomenon (Crombie, Medieval and Early Modern Science, I, 128).

75. For bibliographical details, see note 31, above.

76. Revelli, "Il trattato della marea di Jacopo Dondi," p. 200, 213-216.

77. See Roberto Almagia, "La dottrina della marea nell'antichità classica e nel Medio Evo. Contributo alla storia della geografia scientifica," R. Accademia dei Lincei, Atti, Sci. fis. mat. e nat., Memorie, Series 5, V (1904-1905), 377-535. In this long and interesting article the author has gathered together and discussed all available accounts of tidal phenomena by authors of antiquity and the Middle Ages; however, Jacopo Dondi's treatise is discussed only at second hand.

F-IV-17

78. Particula 23 of the Expositio Problematum Aristotelis.

79. Ibid., 23. 20.

80. Almagia, "La dottrina della marea," p. 412 ff.

81. As noted above, p. 155, he became municipal physician of Chioggia, a coastal town about twenty miles south of Venice, in 1313, and probably moved to Padua in about 1342.

82. "Is etiam Venetiis aliquando commoratus, de fluxu et refluxu maris per singulos dies sexta quaque hora (Scardeone, Historiae urbis patavii, Graevius, VI, Part 3, col. 232, quoted in Revelli, "Il trattato della Marea di Jacopo di Dondi," p. 213).

83. "Motus aquarum dictus a Venetis felle" (De fluxu et refluxu maris, ed. Revelli, p. 242). According to Revelli (pp. 221-224), the expression means neap tide or dead water. Jacopo described it thus: "tunc aqua, suasi fideliter incedens modicum crescit, parumque decrescit, tam etiam in crescendo quam in decrescendo modicus causat cursus" (De fluxu et refluxu maris, ed. Revelli, p. 246).

83. As is pointed out by Revelli ("Il trattato della marea di Jacopo di Dondi," p. 219), Jacopo certainly knew Pliny who is one of the authorities listed at the opening of his Aggregator (Venice, 1481, Klebs, 349.1). I have consulted the copy at the New York Academy of Medicine. He also, according to Revelli (p. 220), knew of the writings on tides of Albertus Magnus (Meteor. 2.3.6, Borgnet IV, 568-571) but did not follow Albertus' explanation of the way in which the influence of the sun and moon is exerted.

F-IV-18

85. De fluxu et refluxu maris, ed. Revelli, p. 238-239.

86. Ibid., chapter 1, pp. 239-240.

87. Ibid., chapter 2, pp. 240-241.

88. Ibid., chapter 3, p. 242-244. At p. 242, "Dico ergo quod alterationes in motibus aque maris contingentes accidant principaliter ex virtute solis et lune secundum eorum respectum ad se invicem."

89. "Tunc aqua maris nullum habet determinatum principium accessionis nec recessionis; sed diverso modo et inordinate aliquando accedet, aliquando recedet. Huius autem variationis aque causa breviter existit, quia sol et luna ubique fuerit, tunc in movendo aquam sibi invicem equaliter contradiunt." (Ibid., chapter 3, p. 244).

90. Ibid., pp. 248-249.

91. Ibid., Chapter IV, pp. 251-252. At page 251: "Cum enim propter naturam aqua sit omnium entium imperfectissima, contingit sepe ipsam ab isto motus ordine aliquant deviare."

92. "que autem sunt sub equinoctiale circulo, habent horizonta rectum, et illis semper sunt dies equales noctibus, quocumque tempore. . . . Sed regiones distantes ab equinoctiale habent horizonta obliquum, et illis in regionibus sunt principia accessionis aquarum ut in regionibus equinoctialibus, ut dictum est, solummodo in duobus temporibus anni, scilicet tempore equinoctii vernalis et tempore autumnalis" (ibid., p. 252).

This passage presumably means that Jacopo believed that the scheme he had worked out was valid for the region in which he actually lived only

F-IV-19

at the autumnal and vernal equinox; such a theory would conveniently minimize the possibility or need for verification by observation.

93. Ibid., pp. 251-254.

94. Revelli, "Il Trattato della marea di Jacopo di Dondi," p. 233.

95. Jacopo Dondi, De causa salsedinis, De Balneis, fol. 109r-v.
See also Thorndike, History of Magic and Experimental Science, III, 392-393.

96. See above, p. 212 and note 27.

97. See note 12.

98. Expositio Problematum Aristotelis, 7.6.

99. Historia animalium, 9.48. The errors may, of course, be those of copyist or printer.

100. "Amplius videtur Aristotelis falsum dixisse bovem non tussire cum manifeste contrarium experiamus" (Expositio Problematum Aristotelis, 10.1).

101. Muscato, Epistola 15, ed. Graevius, cols. 50-51.

102. Dioscorides flourished in the first century A. D. and was the author of a Materia Medica (ed. M. Wellmann, 3 vols., Berlin, 1907-1914), which was widely used in the Middle Ages (see Sarton, Introduction to the History of Science, I, 258-260).

-IV-20

103. Serapion the Younger, who is believed to have flourished in the twelfth century, wrote a popular treatise on simples, printed in several early editions (Klebs 911.1, 2 and 913.1, 2).

104. They were, for example, the principal sources on which Jacopo Dondi drew for his Aggregator.

105. See also, below pp. 298-299.

106. See Thorndike, "Manuscripts of the writings of Peter of Abano," where the explicit and preface of the manuscript of this work in the Bibliothèque Nationale (Cod. Lat. 2220, fourteenth-fifteenth century) are printed. The explicit runs: "Explicit Dyascorides quem Petrus Paduanensis legendis correxit et expennendo que occultiora in lucem deduxit."

107. See below, pp. 298-299.

108. Expositio Problematum Aristotelis, particulae 20) Plantae et olera vel fructices, 21) Polenta et massa, 22) Fructus.

109. Ibid., 20.2; 20. 12; 20. 20.

110. The treatise of Palladius (fl. fourth century A. D.) has been printed in a modern edition, viz., J. C. Schmitt, ed. Palladii viri industriis opus agriculturae (Leipzig, 1848).

111. Expositio Problematum Aristotelis, 20.9: "Nosce quod modus faciendi cucurbitas aut cucumeres maximos ac cetera est hic" (ibid., 20.32).

F-IV-21

112. See A. C. Crombie, Robert Grosseteste and the Origins of Experimental Science (Oxford: Clarendon Press, 1953 and 1962) for detailed discussion of the optical work of these scholars. Professor Crombie has, however, considerably modified his view of the importance of **their** contribution to the development of scientific method that he expressed in the first edition of this work.

113. See above, pp. 119-121.

114. As is shown by its publication in a sixteenth century edition (Basle, 1572).

115. The work of Alhazen (d. 1040) was "the main source of what was known about optics in medieval Christendom" (Crombie, Medieval and Early Modern Science, I, 101). **Alhazeni's** treatise is bound with that of Witelo in the edition of 1572 (Opticae Thesaurus Alhazen Arabis libri septimi . . . item Vitellonis thuringopoloni libri X, ed. F. Risner, Basle, 1572).

116. See above, p. 120.

117. Witelo (1572), 10.65-66, pp. 469-470.

118. Crombie, Robert Grosseteste, p. 213 ff.

119. Carl B. Boyer, The Rainbows: From Myth to Mathematics (New York, London: Thomas Yoseloff, 1959), pp. 102-103.

120. Ibid., pp. 102, 106.

121. Birkenmajer, "Witelo e lo Studio di Padova," p. 153.

122. Witelò (1572) 10.42 and 10.69-70.

123. James A. Weisheipl, O. P., "The Curriculum of the Faculty of Arts at Oxford in the early fourteenth century," Medieval Studies, XXVI (1964), 149-185 at p. 171.

124. See above, note 58.

125. See above, p. 124.

126. Which is possible. Peter stressed the difficulty of the Problemata in his preface to the work, remarking that it could be understood only by those who had studied philosophy in all its branches. Jean de Jandun prepared his own redaction of Peter's commentary for use in the faculty of arts at Paris (see TK 749). Another simplified version is described in Lynn Thorndike, "Peter of Abano and another commentary on the Problems of Aristotle," Bulletin of the History of Medicine, XXIX, No. 6 (November-December, 1955), 517-523.

127. Expositio Problematum Aristotelis, preface.

128. There is a particula on the eyes (No. 31), but it does not discuss the questions raised by Alhazen and the thirteenth century students of optics.

129. See, e.g., Robert Grossetete, On Light (De Luce), trans. E. Riedl, Medieval Philosophical Texts in Translation (Milwaukee: Marquette University Press, 1942), Introduction, p. [5].

C-IV-23

130. "Lux enim dicitur secundum quod est in corpore aliquo lucido a quo actu illuminatur alia, ut in sole vel candela. Lumen secundum quod lux predicta est recepta in aliquo lucido. . . ."

.
 "lumen esse corpus formale, spirituale indivisibile continue generatum"

.
 "Similiter impossibile ac fabulosum est dicere lumen esse sensibile corpus et divisibile"

.
 "lumen esse accidens receptum in corpore dyaphano"

.
 "lux esse secundum se quidem evidentia clara et manifestatio coloris ita quod esset quidam color formalior et notabilior inter colores. . . ."

.
 "lucem non habere firmum esse et ratum in natura sed fore formam solum intentionalem sicut dicitur quod species coloris delata per aerem ad pupillam non habet esse materiale sed spirituale unde in eadem parte aliqua possunt esse species diversorum colorum lumen enim generatum a corpore lucente in dyaphano habet se ad lucem que est forma corporis"
(Expositio Problematum Aristotelis, 11.33).

131. "Omnium formarum visibilium distincta a visio sit secundum pyramidem, cuius vertex est in centro oculi, basis vero in superficie re visa," Witelo (Basle, 1572), 3.18, p. 93.

132. "Notandum est quod perspectivi ponunt visum fieri sub

angulis acutis, dictum enim quod a re visa pretunduntur due linee in directum et continuum angulum constituentes acutum in pupilla ita quod constituitur triangulus ut ysocles cuius basis est in re visa quod si res videnda magna existit et propinqua basis trianguli erit lata a qua linee tendent in pupillam speciem deferentes re vise. Si autem res fuerit distans basis videbitur minorari et linee acuentur in triangulum magis et ponuntur quod si linee concurrant in trianguli antequam perveniant ad pupillam." (Expositio Problematum Aristotelis, 8.9).

122. Ibid., 9.1. Compare Witelo (1572), pp. 85-87.

124. M. Grabmann, "Guglielmo di Moerbeke," p. 56, draws attention to the statement in a manuscript of a work of Archimedes (Oxford, Bodleian Library, cod. Ashmole 424) that "Frater Wyllmus de Moerbek . . . ob cuius fratris rogatum magister Vittulonis flos mathematicorum condidit praesentem perspectivam."

125. This work is known only from a reference in the Perspectiva, to which attention was first drawn by C. Baeumker ("Witelo, ein Philosoph und Naturforscher des XIII Jahrhunderts," p. 242).

126. See above, note 8.

127. "In motu autem violento est econtrario cum virtus illata iactantis continue remittatur donec cadet emissum" (Expositio Problematum Aristotelis, 11, 6).

F-IV-25

138. Ibid., 5. 36; 25. 20.

139. Francischus de Ferraria, in Clagett, Mechanics in the Middle Ages, p. 499: "Questio determinata per me Francischum de Ferraria Padue ad preces quorundam scholarium anno domini MCCCLII". See also above p.77 note 153.

140. Clagett, Mechanics in the Middle Ages, p. 499.

For Bradwardine and his views on motion, see Crombie, Medieval and Early Modern Science, II, 56-58. For the Tractatus Proportionum, see above note 156, p.77.

141. For the work in logic of this group, see above, pp. 76-77 and notes. For their work in philosophy and physics see the studies of K. Michalski, "les courants philosophiques à Oxford et à Paris pendant le 14^e siècle," Bulletin international de l'académie polonaise des sciences et des lettres, Classe de philologie, Classe d'histoire et de philosophie, Année 1919-1920, pp. 59-88; "Les courants critiques et sceptiques dans la philosophie du 14^e siècle," Année 1925, pp. 192-242; "La physique nouvelle et les différents courants philosophiques au 14^e siècle," Année 1927, pp. 93-164. See also J.A. Weisheipl, "Developments in the Arts Curriculum at Oxford in the Early Fourteenth Century," Medieval Studies, 1966, p. 151-175. Of particular interest is Dr. Weisheipl's conclusion: "While logic and physics remained distinct disciplines in the faculty of arts . . . they easily fused in the sophismata. Calculations de motu were apt matter for logical subtleties. . . . This fusion . . .

F-IV-26

should not lead us to minimize the formal distinction between logic and physics at Oxford in the early fourteenth century."

142. Crombie, Medieval and Early Modern Science, II, 57.

143. Clagett, Mechanics in the Middle Ages, p. 332, 499.

Professor Clagett has pointed out that Giovanni di Casali had visited England, where he served as rector of the Franciscan convent at Cambridge in 1340-1341, and may have acquired his interest in the work of the Oxford masters at that time. (M. Clagett, Nicole Oresme and the Medieval Geometry of Qualities and Motions (Madison, Milwaukee and London: University of Wisconsin Press, 1968.) Dr. Annaliese Maier has noted a manuscript dated 1341 (Bibliotheca Vaticana, cod. lat. 3066, fols. 1-8) containing questions disputed by Matthew of Gubbio, Professor of Philosophy at Bologna from 1341 to 1347. According to Dr. Maier these questions are directed against the work of Walter Burley (d. 1344), another of the Oxford masters. (A. Maier, Die Vorläufer Galileis im 14. Jahrhundert: Studien zur Naturphilosophie der Spätscholastik [Rome: Edizioni di Storia e Letteratura, 1966], p. 257.)

144. Buridan's life and works are described at length in Histoire Littéraire de France, XXVIII (1949), 462-605. For Buridan's theory of impetus see A. Maier, Zwei Grundprobleme der scholastischen Naturphilosophie: Das problem der intensiven Grösse, Die Impetustheorie (Rome: Edizioni di Storia Letteratura, 1968), pp. 201-235.

145. "Le domaine propre des sciences naturelles était bien

F-IV-27

établi: il y avait eu un philosophia naturalis en outre l'unité de savoir ne montrait pas de fissure. Et c'est dans cette armure d'unité philosophique que les sciences de la nature étaient entrées . . . dans les premiers universités" (Stephen d'Irsay, "Les sciences de la nature dans les universités médiévales," Archeion, XV (1933), 216-231, at p. 216). "Les sciences naturelles ne peuvent pas être isolées de la philosophie" (ibid., p. 230).

146. The establishment of a faculty of theology was, as noted in Chapter I, authorized by Pope Urban V (Gloria, Monumenti, 1318-1405, II, 55). Theology appears to have been taught privately in the various convents in Padua before that date. According to Mgr. P. Glorieux theological quodlibets were disputed at Padua in 1221 and in 1281 (P. Glorieux, La littérature quodlibétique de 1260 à 1320 [Belgium: Le Saulchoir Kain, 1925]), II, 25. Aegidius Romanus, then a bachelor of theology of Paris, disputed five theological questions before a chapter of the Augustinian hermits at Padua (ibid.).

147. It has been suggested that the banning of the study of the Libri naturales in the arts faculty at Paris was due to the influence of the highly conservative faculty of theology whose members wanted to defend theology "from the pagan infiltration of the new Aristotle" (Van Steenbergen, Aristotle in the West, p. 76).

148. William was so described by his student Engelbert of Admont (Fowler, Intellectual interests of Engelbert of Admont, p. 22, and above p. 70); Peter described himself thus in his will (p. 73 and note 137).

F-IV-28

149. See above, pp. 211-212.

150. Weiss, Il primo secolo dell'umanesimo, p. 34.

151. See above, pp. 211-212.

152. The remarks of Peter of Abano on this subject have already been quoted. See above, p. 207.

153. See above, note 7.

154. Witelo (1572), p. 1-2; also printed in Baumer, "Witelo, ein Philosoph und Naturforscher des XIII Jahrhunderts," p. 127-128.

155. And any discussion of Averroism tends to lose itself in the multifarious definitions of this elusive term. It has been used in a restrictive sense to signify belief in the unicity of the possible intellect and/or some form of double truth, and loosely to indicate any form of heterodox Aristotelianism, as well as for all shades of meaning in between. Yet further complications have been introduced by the contention of Professor P. O. Kristeller that, of the two shibboleths of Averroism, the unicity of the possible intellect was held by Averroes but was never seriously defended by those Christian scholars usually identified as Averroist; a refined and sophisticated version of the double truth was held by many scholastics, but it is not to be found in Averroes (P. O. Kristeller,

F-IV-29

"Paduan Averroism and Alexandrism in the light of recent studies," Atti del XII Congresso Internazionale di Filosofia, Venice, September 12-18, 1958, IX [Florence, 1960], 147-155 at 150-151.) In general, the modern tendency has been to substitute some such term as radical or heterodox Aristotelianism for most of the broader uses of "Averroism," and to reserve the latter term for the system of concepts specifically found in the writings of Averroes. In the present discussion both the term and the subject will be avoided as far as possible, since it does not seem that anything useful can be added at this stage.

The main contributions to the literature of the controversy concerning the origins of Paduan Averroism are as follows: Ernest Renan, Oeuvres complètes, III (Paris: Calmann-Lévy [1949]), 11-365, Averroès et l'Averroïsme: Essai Historique, E. Peichari, the chapter on Paduan Averroism is at pp. 248-323; Sante Ferrari, I tempi, la vita, le dottrine di Pietro d'Abano (Genoa, 1900); Thorndike, History of Magic and Experimental Science, II, Chapter 70 (Peter of Abano), 874-946; Bruno Nardi, "la teoria dell'anima e la generazione delle forme secondo Pietro d'Abano," Rivista di filosofia neo-scholastica IV (1912), p. 723 ff, and "Intorno alle dottrine filosofiche di Pietro d'Abano," Estratto dalla Nuova Rivista Storica, Anno V, Fasc. II-III (Milan-Rome-Naples, 1921), p. lff. in B. Nardi [Papers and pamphlets, 1921-1927], Butler Library, Columbia University, New York (Nardi's articles are reprinted in B. Nardi, Saggi sull'Aristotelismo

F-IV-30

padovano dal secolo XIV al XVI [Florence: Sansoni, 1958]); P.O. Kristeller, "Petrarch's 'Averroists': A note on the history of Aristotelianism in Venice, Padua, and Bologna," Bibliothèque d'Humanisme et de Renaissance, No. 14 (1952), p. 59-65; Erminio Troilo, "L'oroscopo delle religioni: Pietro d'Abano e Pietro Pomponazzi," Figura e dottrine di Pensatori, 1 (Naples, 1932).

156. Nardi, "Intorno alle dottrine," p. 25, 27-28.

157. Thorndike, History of Magic and Experimental Science II, 886-887, 938-946.

158. Kristeller, "Petrarch's 'Averroists,'" passim.

159. "que est causa generationis que consistit a principio ipsis generatis quando mundus fuit generatus" (Expositio Problematum Aristotelis, 10.13).

160. "a non apparuit unquam nobis igitur generatio, et mundus non incepit sed ab eterno consistit sicut probatur in 8^o phisicorum, quod veritati orthodoxe fidei adversatur non parum . . . multos qui posuerunt mundum incepissi sicut enim ipsi ponebant omni generari ex materia per putrefactionem virtute corporum superiorum. . . . Et hoc bene potest esse," (ibid.).

161. "Transmutationes corporum celestium sunt sufficientes et potentes agere ut semen fiat id ex quo quid in aliquid quod

P-IV-31

accidit esse subiectum eius quod debet generari quod postea determinatur ad aliquam formam ex virtute stellarum et forma specifica sue specie quibus totus mundus est plenus" (ibid.).

162. Et quod in homine [virtus stellarum] non sufficiat apparet quoniam eius anima non educitur de potentia materie sed datur a datore primo etiam secundum philosophos. . ." (ibid.).

163. "Quando aliquis antiquatur et pervenit in terminum quia in corruptionem revertitur iterum in principium puta in generationis principia ut in elementa et materiam primam. . . . Cum huius motus circularis [of the stars] sit causa omnium generabilium et corruptibilium. Motus enim hic inferior sive mundus est continuus superioribus . . . gubernetur" (ibid., 17.3).

164. Conciliator, Diff. 48, cited in Nardi, "Intorno alle dottrine;" p. 1 and "La teoria dell'anima," p. 724-725.

165. Nardi, "Intorno alle dottrine," p. 38-40.

166. "No agente nobilissimo ut deo glorioso et supremo," (Conciliator, Diff. 71, quoted in Nardi, "La teoria dell'anima," p. 726).

167. Nardi, "Intorno alle dottrine," especially p. 24 and 31-32. See also the passage quoted in note 150, above.

168. P. Duhem, "Medieval Physics," in Toward Modern Science,

F-IV-32

pp. 141-159 at p. 149, where the author speaks of the "blind confidence" in Aristotelian physics of Averroes and his followers. This essay originally appeared as part of the article "Physics, history of" in Catholic Encyclopedia, XII (1911), 47-52.

169. See above p. 150.

170. See, for example, M. Grabmann, "Das Aristotelesstudium in Italien zur Zeit Dantes," in his Mittelalterliches Geistesleben (2 vols. Munich: M. Hueber, 1926-1956), III, 197-212; A. Maier, "Ein Beitrag zur Geschichte des Italiensche Averroismus im 14 Jahrhundert," Quellen und Forschungen aus italienischen, Archiven und Bibliotheken, XXXIII (1944), 136-157; and by the same author, "Wilhelm von Alwicks Bologneser Questionen gegen den Averroismus (1323)," Gregorianum, XXX (1949), 265-308; also her "Eine Italienisch Averroistenschule aus der ersten Hälfte des 14 Jahrhunderts," pp. 251-278; B. Nardi, "L'Averroismo bolognese del secolo XIII e Taddeo Alderotti," Rivista di Storia della Filosofia, IV (1949), 11-20; Charles Ernster, "Averroism in early fourteenth century Bologna," Medieval Studies, XVI (1954), 35-56.

171. See above, p. 236.

172. Grabmann, Mittelalterliches Geistesleben, III, 204.

173. Gloria, Monumenti, 1222-1318, pp. 362-364, contains a biographical account of Dino. For bibliographical information

F-IV-33

concerning his numerous medical works, see below, pp. 285 and notes.

174. Scriptus Dini super libro de natura fetus Hypocratis
 fols. 45v-89r of Jacopo da Forlì Expositio . . . supra capitulum
[Avicennae] De generatione embrionis . . . Dinus supra eodem.
Dinus supra librum Ypocratis De natura fetus (Venice, 1518; I have
 consulted the copy at the New York Academy of Medicine). The
 introduction occupies fols. 45v-53r. Dino was also the author of
 a philosophical commentary on the Canzone d'Amore of the poet
 Guido Cavalcanti (d. 1300). Since this is edited, described
 and analyzed in exhaustive detail in Otto Bird, "The Canzone d'Amore
 of Cavalcanti according to the commentary of Dino del Garbo,"
Medieval Studies, II (1940), 150-203 and III (1941), 117-160, it
 will not be discussed here.

175. Dinus super libro de natura fetus Hypocratis, fol. 45v.

176. "Dico quod falsus est quod facilius sit nature facere
 spiritum qui est anime instrumentum quem cor: quod si spiritus iste
 non esset aliud quam quidam vapor temperatus bene esset verum."
 (ibid., fol. 47v).

177. Ibid.

178. Sante Ferrari suggested that Dino del Garbo took the
 teachings of Peter of Abano from Padua to Bologna (Ferrari, I tempi,
la Vita, p. 415); It seems at least equally likely that Dino
 brought Bolognese Aristotelianism to Padua.

CHAPTER V

MEDICINE AND SURGERY

Medicine was probably the ultimate calling of many if not most of the students of arts at Padua in the thirteenth and fourteenth centuries. Peter of Abano's belief that the liberal arts, natural, or physical science (scientia naturalis), and metaphysics were all necessary to the training of the physician appears to have mirrored a curriculum in which, in practice, all those subjects led up to and were crowned by the study of medicine. As already noted, the teachers of Aristotelian natural, or physical, science, metaphysics, astrology, and probably also the other quadrivial arts, seem usually to have been doctors of medicine.¹ The further opinion expressed by Peter of Abano that it was not necessary for most physicians to know all of these subjects with equal thoroughness or as thoroughly as they knew medicine² probably also reflected an actual state of affairs. In addition, there are many more works on medicine extant by doctors who taught at Padua before 1350 than on any of the other subjects discussed in this study.³ These facts are in themselves perhaps enough to indicate the special position occupied in the schools by the study of medicine.

The study of medicine and surgery at Padua appears to have begun in the middle decades of the thirteenth century. There seems to be no evidence that these subjects were taught in the 1220s and 1230s, in the period before the decline of the schools under Ezzelino da Romano, but several items of information indicate that physicians

V-2

and surgeons were present and that some medical teaching may have taken place in Padua in the years of the da Romano tyranny (1237-56).

For example, Bruno da Longoburgo of Calabria, author of two important treatises on surgery was certainly at Padua in 1252 and possibly also before and after that date. Bruno's Chirurgia Magna was completed at Padua in 1252; his Chirurgia Parva was written for one Lazzaro of Padua, with whom Bruno had been associated for many years.⁴ There is no proof that Bruno was a teacher, but the nature of the Chirurgia Magna indicates that such may well have been the case. It is a systematic textbook of various kind of injuries and their treatment and contains citations of Arab medical authorities.

Furthermore, a strong tradition claims that S. Filippo Benizi, a noted member of the Servite Order, studied medicine at Padua in 1253.⁵ The story that he received a doctorate in medicine at the age of nineteen after one year's study⁶ is probably an example of hagiographic enthusiasm, since, as already demonstrated, there was almost certainly no College of Doctors of Arts and Medicine to examine for such a degree at that early date. Moreover, the normal medical course as later established appears to have lasted at least four, and probably often five, years.⁷ It was evidently not unknown, however, for persons to set themselves up in medical practice after a much shorter period of study, even in the fourteenth century, when formally organized medical studies leading to a degree had long been instituted. For example, Mussato, writing probably in the 1320s, mentioned "many who practise as physicians, wearing a physician's robe, after studying for scarcely a year."⁸ Thus it appears perfectly possible that S. Filippo may have been in Padua at the time mentioned and that he may either have

served some form of apprenticeship to a practising physician or pursued informal medical studies there.

The study of medicine was certainly part of the curriculum of the schools by 1262, when, as several times noted above, Rolandino recorded the presence of three regent masters of phisica, or medicine.⁹ At least one of the professors named by Rolandino, Zambonino, or Giovanni Buono da Gaza of Cremona, appears also to have been a medical author. To him is probably to be attributed the brief Tractatus de conservatione sanitatis, a work mainly on diet, which survives in what is apparently a unique fourteenth century manuscript now in the Biblioteca del Seminario Vescovile in Padua.¹⁰ Zambonino, who died before 1287, was said in his epitaph to have acquired his doctorate in medicine at Paris.¹¹

As will be demonstrated below, the Parisian education of Zambonino is only one of several indications that the medical school of Paris exerted significant influence upon Paduan medical teaching before 1350. Another important source of influence in the late thirteenth and early fourteenth century was Bologna, where the famous Taddeo Alderotti of Florence was a professor in the years ca. 1260-1303.¹² Taddeo was the author of several commentaries on Hippocratic works, and he and his pupils were probably an important source of Hippocratic teaching at Padua; in addition, they were noted for their introduction into Italy of the use of Aristotelian logical analysis and natural philosophy in medical exposition.¹³ The earliest Paduan teacher known to have been a follower of Taddeo

V-4

Alderotti was William of Brescia, who left Padua soon after 1280 in order to study medicine under Taddeo at Bologna.¹⁴ William never returned to Padua,¹⁵ but the influence of Taddeo and his school continued to be felt there throughout the period with which this study is concerned.

Yet by the early years of the fourteenth century, the Paduan medical school was by no means without distinction in its own right. Matteo da Roncagetta, a professor of medicine who died in 1303, is said to have written a commentary on the Microtegni, or Ars parva, of Galen and to have interpreted the logic of Aristotle surpassingly well.¹⁶ If this account is correct, it sounds as if the application of dialectic to medicine began at Padua even before the advent of Peter of Abano in about 1300.

The wide range of Peter of Abano's learning and the organization of the present study, which has made it necessary to allude to his treatment of astronomy and the other arts, as well as of natural or physical science and metaphysics, before discussing his medical writings, may perhaps have obscured the place of medicine in Peter's professional career. It should therefore be reiterated that Peter of Abano was both a professor of medicine and in all probability a practising physician¹⁷ and that the bulk of his writing concerns medical topics. Peter's medical works include by far the greater part of the Conciliator, lengthy sections of the Expositio Problematum Aristotelis, a treatise on physiognomy,¹⁸ another on poisons,¹⁹ a supplement on complaints of the heart and digestive system for the Grabadin, or book of remedies, of Mesue,²⁰ and an edition of the pharmacopoeia of Dioscorides.²¹ He also translated a number of Galenic treatises from Greek into Latin, and, as already noted, a supposedly Hippocratic treatise on medical astrology.²²

Peter's medical works appear to have been highly regarded and widely used. The Conciliator survives in at least fifteen manuscripts, and the De venenis in more than forty.²³ It has already been noted that Peter of Abano spent a number of years teaching at Paris, where he wrote the Phisionomia and part of the Conciliator and began work on the Expositio Problematum Aristotelis.²⁴ Whether it was at Paris or at Padua that Peter acquired his own medical training does not appear to be recorded. Since he was apparently born about 1250²⁵ or shortly thereafter, he was probably a medical student in the 1270s, by which time, of course, instruction in medicine was definitely available in the Paduan schools. The securely established medical school of Paris may, however, have held more attraction for a brilliant student like Peter than the Paduan faculty of medicine, which was still in its infancy. Moreover, he may have been drawn to Paris by its reputation as a center for the study of Aristotelian philosophy and natural science, topics in which his works show him to have been deeply interested. It is perhaps somewhat remarkable that Peter of Abano, unlike William of Brescia, his approximate contemporary, evidently did not choose to study medicine under Taddeo Alderotti, the most celebrated Italian physician of his day, at the relatively near and accessible studium of Bologna. In any case, wherever Peter of Abano may have begun his medical studies, his advanced work and early teaching experience took place at Paris. There can be little doubt, therefore, that his medical teaching at Padua after 1306 reflected Parisian influences.

Almost as distinguished as Peter of Abano was his fellow professor of medicine, Dino del Garbo,²⁶ who was praised by the Florentine

V-6

historian Giovanni Villani as "a very great doctor of medicine and of many branches of natural science and philosophy, who in his time was the best and sovereign physician in Italy."²⁷ As noted above, Dino, the nephew and most illustrious pupil of Taddeo Alderotti, appears to have taught at Padua in 1311-12. The most important of his numerous and influential works are probably two massive commentaries on the Canon of Avicenna; that on the fourth fen of the first book is entitled Dilucidatorium totius practice generalis medicinalis scientie,²⁸ and provides, as the title suggests, a comprehensive survey of medicine; the other, on the third, fourth, and fifth fen of the fourth book is known as the Chirurgia²⁹ and does the same for surgery. Both these works are said to have been composed at the request of King Robert of Naples³⁰; part of the Dilucidatorium was written during Dino's stay at Padua.³¹ Dino also commented on the Ars parva and De malitia complexionis of Galen, and upon several Hippocratic treatises, among them the Aphorisms and the De natura foetus.³² In addition, he was the author of a treatise on the weights and measures used by physicians, apothecaries and others, in which the weights and measures in use in Bologna, Padua, and Salerno, the main centers of medical teaching, are compared.³³

The generation of professors of medicine following that of Peter of Abano and Dino del Garbo appears to have been somewhat less distinguished, although by no means entirely lacking in achievement. Mention should be made of Giovanni Mondino da Cividale del Friuli (d. before 1340), who, although he began to teach at about the same time as Peter of Abano, continued to do so until after 1328.³⁴ Mondino, who is not to be confused with the Bolognese anatomist Mondino de' Luzzi (d. 1326),³⁵

was the author of a supplement to the Synonyma or medical dictionary composed by Simon of Genoa in the late thirteenth century.³⁶ Nicolò di Santa Sofia, who was the founder of a noted family of Paduan physicians, and who is said to have been a pupil of Peter of Abano, is known only as the author of a collection of medical recipes.³⁷ The general impression remains that medical teaching at Padua was not particularly noteworthy in the twenty years following the death of Peter of Abano in about 1316.

The above impression is perhaps confirmed by the fact that Gentile da Foligno, the next doctor of medicine of more than local distinction to teach in Padua, appears originally to have been brought to the city not as a professor but as personal physician to Ubertino da Carrara.³⁸ Gentile, who is said to have studied under Taddeo Alderotti, and to have been a great admirer of Peter of Abano, probably lectured at Padua in the years 1337-1345.³⁹ One of the most celebrated physicians of his day, Gentile commented upon almost the whole of the Canon of Avicenna, as well as upon the Ars Parva of Galen and on a work on urines and pulse by Giles of Corbeil.⁴⁰ Gentile da Foligno is best known, however, for his numerous consilia and questions, most of which discuss practical considerations regarding medical treatment.⁴¹ His works were widely used until the sixteenth century, and a number of them are printed in early editions.

Gentile appears to have been somewhat unfavorably impressed by the faculty of medicine at Padua, or at any rate, to have believed that it could do with an infusion of new ideas. He is said to have suggested to Ubertino of Carrara a plan whereby twelve Paduan students were sent to study medicine in Paris, and twelve Parisian students were invited to Padua in return.⁴² This plan appears to have been put

V-8

into practice, at least in part, since the names of several Paduan students occur in the records of the University of Paris at the appropriate date.⁴³ At least two of them later taught medicine at Padua.⁴⁴ In the early 1340s the Paduan faculty of medicine acquired another distinguished professor in Jacopo Dondi, whose astronomical work has already been discussed.⁴⁵ He was, as noted, also the author of a dictionary of medicinal simples entitled the Aggregator.⁴⁶

It thus appears that the faculty of medicine entered upon a period of restoration and improvement in the middle decades of the fourteenth century. The growing independence of the University of Arts and Medicine and its willingness, by 1360, to defy the jurist universities⁴⁷ are further indications of increased self-confidence and assertiveness among the phisici of Padua. That their confidence was fully justified is shown by the long series of celebrated doctors who lectured on medicine in the schools of Padua in the second half of the fourteenth century. Although the list of these doctors would carry one far beyond the bounds of the present study, mention should at least be made of Giovanni Dondi, the friend and correspondent of Petrarch, and Marsigliodi Santa Sofia, the leading member of a famous Paduan medical dynasty.⁴⁸

Such then was the history of the faculty of medicine at Padua in approximately the first century of its existence. The available sources for determining the structure and content of teaching in this faculty are, fortunately, somewhat more abundant than for the disciplines discussed in earlier chapters. In the first place, and most importantly, the relatively large number of medical works written by doctors associated with Padua before 1350 enables one to get a fairly comprehensive

V-9

idea of the scope and nature of medical teaching. Second, the inventory of books owned by Benedetto Greco di Salerno, a medical student who was rector of the University of Arts and Medicine in Padua in 1399,⁴⁹ includes several medical texts available before 1350. Some or all of these may well have been utilized in Padua in the earlier period. Thirdly, the statutes of the University of Arts and Medicine of Bologna compiled in 1406, include a list of required medical works, a number of which are of early date and may have been in continuous use at Bologna from the thirteenth century.⁵⁰ Since, as has already been demonstrated, the Bolognese medical school definitely influenced that of Padua in the thirteenth and fourteenth centuries, it is quite probable that the texts mentioned were also in use at Padua. And finally, the statutes of the Paduan University of Arts and Medicine, drawn up in 1466, also include the names of medical works available, and therefore probably used, at a much earlier date.⁵¹ Substantial agreement between these three lists as to the essential medical texts strengthens their reliability as evidence. It is therefore proposed to draw mainly on the foregoing sources for an account of the theory and organization of medical teaching and the ways in which the subject of medicine was sub-divided; of the works used as texts; and of the content of study.

Although the term phisica was in practice often used as synonymous with medicina, medicine was in theory a branch of phisica understood in the sense of natural science.⁵² At Padua, the dignity of medicine as a true science was strongly emphasized. Peter of Abano devoted two entire differentiae of the Conciliator to proving first, that medicine was a science, and second, that it was outstanding among the arts.

The whole thrust of his argument was designed to prove that medicine had a theoretical side and was properly to be included among the speculative sciences, and to refute those who claimed that it was merely a practical subject which should be categorized among the mechanical arts. Peter considered that the science of medicine was outstanding among the arts because it was of greater use, and more needful to man than the others; it brought honor, wealth and friendship to its devotees.⁵³ In making these claims, Peter appears to have run contrary to the opinion of St. Thomas Aquinas, who considered that sciences involving bodily activity, like medicine and alchemy, could not be called liberal arts, "because such activity belongs to man on the side of his nature in which he is not free, namely, on the side of his body."⁵⁴ Medicine, like other sciences, was divided into theoretical and practical branches.⁵⁵ This division, explained by Peter of Abano at the beginning of the fourteenth century,⁵⁶ ultimately came to be reflected in the curriculum of the Paduan schools. In 1391 a lecturer in practica is recorded, and in the fifteenth century statutory provision was made for the appointment of separate professors of theory and practice.⁵⁷ It is possible that theory and practice may have been taught separately before 1350; on the other hand, no professors appear to be described in the documents as "of theory" or "of practice" in the early period. Moreover, it would seem that Dino del Garbo and Gentile da Foligno each taught both branches of medicine, since the works of each include both highly speculative and abstract discussion of medical theory and practical suggestions for treatment in individual cases.

V-11 Possibly the separation of theory and practice in the curriculum was a result of the expansion of the medical faculty in the later fourteenth century.

Theoretical medicine was conceived of as embracing the study of medical principles, such as the ubiquitous theory of the four elements and their related humors, and of the classification of diseases. Enough has already been said in previous chapters to demonstrate the extent to which medical thinking was governed by a methodology derived from Aristotelian logic and by belief in the all-pervasive influence of the celestial bodies. Practical medicine concerned the description of symptoms and treatment. In both theoretical and practical medicine, heavy reliance was placed upon the principal Greek and Arab medical authorities, namely Hippocrates, Galen and Avicenna. Thus, the Bolognese university statutes of 1405 prescribe for the course in theoretical medicine a complex four-year cycle of lectures on the works of these writers, in which a number of books recur more than once. The works to which most attention appears to have been given were the first book of the Canon⁵⁸ of Avicenna, the Aphorisms and Prognostications⁵⁷ of Hippocrates and, of the Galenic treatises, the Tegni, De crisi and De febris.⁶⁰ The Colliget⁶¹ of Averroes was also a required text at Bologna by 1405.

The Aphorisms and the Prognostications remained, along with the shorter Microtegni⁶² in place of the Tegni, at the core of the Paduan curriculum in 1465, although in the Paduan statute a list of texts remarkable chiefly for its brevity replaces the elaborate and detailed timetable given for Bologna. Moreover, the medical works possessed by Benedetto Greco at Padua in 1401 included the Aphorisms of Hippocrates,

V-12

two otherwise unidentified volumes of Galen, and commentaries on various parts of the Canon of Avicenna. There cannot be much doubt that the same works were used as fundamental texts in teaching medicine at Padua in the years before 1350. As noted, all three authors were commented upon by Dino del Garbo and Gentile da Foligno, and the works of Peter of Abano abound in citations of all three. Despite the respect accorded to Hippocrates and Galen, however, Avicenna was probably in practice the authority most frequently turned to. The major commentaries of Dino and Gentile are all on various parts of the Canon, and Avicenna appears to be the medical author most frequently cited in the Expositio Problematum Aristotelis of Peter of Abano. The Colliget of Averroes was also utilized at Padua; it was apparently translated into Latin there in 1255 or 1269 and was cited by both Peter of Abano and Dino del Garbo.⁶³ It does not, however, seem to have replaced the Canon as the principal source of medical information. In all probability, the work of Avicenna retained a position of pre-eminence on account of the sheer mass of material about every branch of practical medicine therein contained. In this connection, it is of interest to note that the third book of the Canon, which describes human diseases "from the head to the feet" is the sole text prescribed for the course in practica by the Bologna statutes of 1405.⁶⁴

In both theoretical and practical medicine, the works of the Greek and Arab authorities were supplemented by a number of more recent texts. These took various forms, and included scholastic commentaries on authoritative works, general treatises on medicine, questions, consilia, medical dictionaries, herbals, and collections of medical recipes.

V-13

Although writing on medical theory tends to be concentrated in the commentaries and general works, it is not correct to suppose that these were exclusively concerned with theory. For example, both the commentaries on Avicenna by Dino del Garbo relate mainly to practica; one claims in its title to elucidate "the whole of practical medicine,"⁶⁵ and the other relates to surgery, which Dino considered a branch of practica.⁶⁶

Among the recent commentaries and general works utilized at Padua in the first half of the fourteenth century were no doubt the Conciliator and Expositio Problematum Aristotelis of Peter of Abano and the various commentaries of Dino del Garbo and Gentile da Foligno. Also studied, in all probability, was the Plusquam commentum, or "More than commentary," on the Ars parva by Turisanus (Pietro Torrigiano de' Torrigiani, d. ca. 1350), yet another pupil of Taddeo Alderotti, who studied and taught at both Bologna and Paris.⁶⁷ This work was among the possessions of Benedetto Greco in 1401,⁶⁸ and is prescribed in the statutes of the University of Arts and Medicine of 1465.⁶⁹

Since Turisanus did not himself teach at Padua, and since some of the speculative and theoretical writings on medical topics of Gentile da Foligno and Dino del Garbo have been described elsewhere, the following samples of the nature of medical theorizing are drawn from the Conciliator and Expositio Problematum Aristotelis of Peter of Abano.⁷⁰ Somewhat more attention has, however, been paid to the latter work, which appears to have been less fully described by recent scholars than the Conciliator.

Although the Expositio Problematum Aristotelis is not, of course,

V-14

a systematic treatise on medicine, the subject of medicine is quite extensively treated therein. The whole of the first particula, or book, consists of medical problems; in addition, human physiology is discussed in particulae on sweating, drunkenness, sexual intercourse, fatigue, recumbent positions, sympathetic action, chill and shivering, bruises, scars and wounds, voice, odors, pleasant and unpleasant, and the organs of sense.⁷¹

Peter of Abano's medicine is not always easy to separate from his astrology, for he followed Avicenna and other Arab medical authorities in ascribing to the stars a major role in human physiology and in the etiology and cure of disease. He also emphasized the physiological effects of climatic factors, and as might be expected of a follower of Galen, of the four humors; for example, he attributed the fact that some sedentary people get fat while others stay thin to differences in their humors.⁷² He held that the humors themselves were ultimately affected by the stars. Explanations in terms of heat and cold appear to predominate and less emphasis is given to moisture and dryness. Thus, the explanation of why rapid motion in men and other animals predisposes to diseases of the head and eyes is that such motion causes fumositates to be retained in the head; they heat it, and so attract cold and heat from the external air, which in turn produce sickness.⁷³

Peter also attached much significance to the concept of superfluitates. This term can refer to the bodily secretions and excreta, or rather to a substance conceived as the common source of any or all of them. Thus, in a discussion on coughing, Peter remarked that women cough even though they lose many superfluities through menstruation.⁷⁹ But

V-15

the term can also refer to matter which is not necessarily excreted: in Peter's view, for example, such complaints as varicose veins and elephantiasis of the legs were caused by the descent of superfluities to the lower limbs.⁷⁵

Regarding human psychology, Peter seems to have held somewhat materialistic views, since he provided elaborate physiological explanations for such phenomena as the thirst felt by condemned men, and the sleepiness induced by boring books.⁷⁶

Concerning disease, Peter emphasized the importance of climatic factors, notably winds, and of astrological conjunctions; for example, he remarked that fevers and shivering were affected by the moon.⁷⁷ Sickness is defined, following Galen, as excess of motion or disturbance,⁷⁸ of which one important variety is brought about by imbalance in the humors. For instance, Peter attributed vertigo on standing up to the disturbance of the humidity that collects in one part of the body when the subject is sitting still.⁷⁹ The nature of disease, according to Peter, is to change things into their opposites; that is why scars show up white on the eye and dark on the rest of the body, although this may not apply to the Ethiopians, whose bodies are black all over.⁸⁰

Peter's views on dental decay seem more pragmatic than most of his medical lore; he attributed it to the putrefaction of foodstuffs in the mouth.⁸¹

The section on remedies in the Expositio Problematum Aristotelis contains a few references to contemporary medical practices, such as keeping fever patients warm and inspecting urine for diagnosis,⁸² but there appears to be nothing definitely or exclusively based on Peter's own experience as a practising physician. From Avicenna, Peter had

V-16

learned that certain "pestilential diseases" are contagious; outbreaks are the result of corruption in the air, which may be produced by either astral or terrestrial causes. Peter observed that badly nourished people with a faulty regimen were more likely to catch the pest.⁸² While he accepted the belief of Avicenna that plagues of spontaneously generated frogs, mice and snakes were likely to appear in pest years, he was careful to point out that such infestations were a sign, not a cause, of disease. He further noted that they were more likely to occur in warm damp years. In this instance, too, Peter believed the controlling causes of the phenomenon to be astrological.⁸⁴

Despite the occasional intrusion of lengthy digressions on astrology, geography, and such problems as whether "the so-called specific form is a substance or an accident," the Conciliator, unlike the Expositio Problematum Aristotelis, is primarily a medical work, as the following brief survey of its contents will show. The opening differ-entiae in which the science of medicine and its methods are explained and defended, are followed by a fairly systematic survey of problems concerning the different branches of medicine. First to be discussed are the fundamental concepts of the four elements and the associated ideas of complexion and the humors. Peter then dealt with the human body in health, treating first its origin, namely human generation; secondly, its parts; thirdly, the nutritive and other "virtues" by which the body is maintained; and finally, its operations, such as sight and digestion. He next moved on to consider the body in sickness. Groups of differ-entiae are devoted to the nature of sickness in general; to the main signs by which sickness is manifested in the heartbeat, pulse, and urine; and to particular types of disease, such as fevers, abscesses,

V-17

(apostemata), and so on. Next follow differentiae on the cure of sickness. Among the topics emphasized in this connection is the calculation of the critical days in the course of a disease. Medieval medical writers attached considerable importance to the concept of the critical days, which were believed to be astrally determined, since their occurrence was held to affect the administration of medication.

Among the specific medical and physiological questions discussed in the Conciliator are such problems as whether pain is a disease in itself⁸⁶; whether the nerves originate in the heart or the brain⁸⁶; whether the veins originate in the liver or the heart⁸⁷; and whether a small head is a better sign of health than a large one.⁸⁸ Peter held fairly enlightened views on at least two of these questions, since he was of the opinion that pain is a symptom not a disease and that the nerves originate in the brain; he also thought the nerves responsible for the movement of the muscles.⁸⁹

Commentaries and general works such as the Expositio Problematum Aristotelis and the Conciliator were by no means the only type of text available to supplement the classical authorities on medicine. Physicians, like theologians and masters of arts, debated difficult or disputed points of their science in the form of questions or quodlibeta.⁹⁰ For example, the printed works of Gentile da Foligno include Quaestiones subtilissimae in artem parvam Galeni,⁹¹ a Quaestio de maioritati morbe⁹² and Quaestiones de prolongatione febris.⁹³ Furthermore, a large number of medical questions are included in a manuscript written by a certain Augustinus at Padua in 1361 and now preserved in the Biblioteca Universitaria of Padua.⁹⁴ Included in this collection are questions on such topics as whether the motion of the eyes is natural or animal,⁹⁵ whether

V-16

disease can be hereditary,⁹⁶ whether stupefacients are of use in treating colic,⁹⁷ and whether an ulcerated wound in the lung is curable.⁹⁸ Most of the questions are anonymous, but some are attributed to famous physicians who flourished at Padua or Bologna before 1350, among them Taddeo Alderotti, Dino del Garbo and Bartolomeo da Varignana.⁹⁹ Further evidence of the close connection of medicine and natural science at Padua is the fact that the volume in which these questions are found also contains an abbreviation of or comment upon the Physics of Aristotle.¹⁰⁰

For the study of practica, the scholar had available to him, in addition to the relevant portions of the Canon of Avicenna and commentaries thereon, numerous consilia by the leading physicians of the day.¹⁰¹ The consilium was usually a description of a particular case and the treatments used therein. In some cases, consilia appear to have been written originally as directions for the patient or his attendants, although later included in collections of such works either because of their medical interest or because the patients concerned were well known. For example, a consilium of Gentile da Foligno written for Brother Angelus de Quatrelus first describes the debility of the brother's brain and nerves and then prescribes a syrup to remedy this condition.¹⁰² Gentile da Foligno, like the other physicians of his age, did not hesitate to publicize the names, ailments and treatments of his more distinguished patients, among them Ubertino of Carrara and his sister, who suffered from persistent catarrh.¹⁰³

In cases of particular medical interest consilia were clearly written in the first place for the information of other physicians. A consilium of Gentile on a case of snake bite falls into this class; in it he described how a patient had been bitten by a particularly dangerous

V-19

type of snake and, after lingering at death's door for several days had recovered thanks to Gentile's medications.¹⁰⁴

Not all consilia concerned individual cases; some dealt with outbreaks of a particular disease. One of the most celebrated consilia in the latter category is Gentile da Foligno's tract on the pest, which was in all probability written at the time of the Black Death, although it contains allusions to the author's experiences during earlier epidemics at Padua.¹⁰⁵

On the whole, a sampling of the consilia of Gentile da Foligno shows relatively little reliance on astrology, bizarre ingredients in medicines, or the use of charms and incantations, and a good deal of sensible advice on diet and regimen accompanied by the prescription of harmless-sounding herbal mixtures.¹⁰⁶ Consilia of all kinds were collected and copied; they exist in sufficient numbers to make it clear that they were used for purposes of study.

Students of medicine and, no doubt, practising physicians at Padua also had at their disposal a number of works of reference, including medical dictionaries, herbals, and collections of medical recipes. Undoubtedly utilized at Padua was the Synonima, or medical dictionary, of Simon of Genoa and the edition of that work prepared by Mondino Friuliano. Simon's work contained some 6,500 entries; the edition of Mondino omitted some of these, but added others.¹⁰⁷ Also in use were the herbals of Serapion, referred to by Peter of Abano, and of Dioscorides.¹⁰⁸ Peter, as already mentioned, appears to have lectured on Dioscorides and prepared an edition of or commentary on the text. Yet another reference work was Peter's supplement to the Grabadin of Mesue.¹⁰⁹ In addition, collections of medical recipes associated with Padua in the

V-20

period before 1350 included the Receptae of Nicolò di Santa Sofia,¹¹⁰ alluded to above, and the Medicamenta of Dino del Garbo.¹¹¹ Medical recipes also abound in the consilia of Gentile da Foligno, and various collections of recipes are attributed to him.¹¹¹

Probably the best known of the works of reference compiled by physicians teaching at Padua before 1450 is, however, the Aggregator of Jacopo Dondi. The Aggregator and two other volumes associated with it, namely the Enumeratio remediorum simplicium et compositorum and the Promptuarium medicinae, constitute, in the words of Professor L. C. Mackinney "a topically organized encyclopedia of medical dictionaries."¹¹² The Aggregator lists the names of simples (that is, natural substances used in medicine) in alphabetical order, providing citations of descriptions in the works of medical authorities for each herb named. There follow indices of different types of remedies and of specific remedies for various diseases and injuries. The preface to the Aggregator names the various authorities relied upon by Jacopo in compiling the work; those principally drawn upon were Dioscorides, Pliny, Galen, Rhazes, Haly Abbas, Mesue, Avicenna, Simon of Genoa, and Albertus Magnus.¹¹³

The foregoing discussion makes it obvious that, despite the emphasis upon the study of Greek and Arab authorities, on scholastic analysis of texts, and on astrology, the teaching of medicine at Padua was in the hands of practising physicians and largely oriented toward medical practice. Indeed, it may be recalled in this context that Petrarch, who was for years a resident of Padua, and who was intimately acquainted with physicians of the Paduan school,¹¹⁴ complained that the physicians of his day valued practical experience too highly rather than

V-21 not enough: "among physicians, he who has a passion for experimenting and putting more lives in peril, he is the one who is foremost [who is] pointed out and accounted a leader and master by his fellows. He has great practice, great experience, they say; which means that he has acquired the habit of murder with impunity."¹¹⁵

As has been shown, the two principal medical theorists at Padua in the years before 1350, Dino del Garbo and Gentile da Foligno, both wrote copiously about their own practical medical experience. Peter of Abano, too, appears to have been a practising physician, although there is less evidence of this in his writings. Possibly his various other interests restricted the amount of time available to him for medical practice. That Peter envisaged a career in practice for his pupils is evident from those passages of the Conciliator in which he described the attributes of the ideal physician. A good medical man, Peter held, should have both book learning and practical experience. Furthermore, he should not be so handsome that his patients feared for their wives.¹¹⁶ It was evidently more or less standard practice to include some such recommendation as the last in medieval medical works, along with exhortations to the young physician to avoid frivolous pursuits such as hunting and playing musical instruments. Similar passages have been noted in the writings of a number of fourteenth century authors.¹¹⁷ The repetition of this advice by Peter of Abano, one of the most scholastic of medical writers, provides rather strong evidence that medical theory was never divorced from practice in the schools, even when the union of philosophy and medicine was at its closest.

It should perhaps also be noted that at least two practising physicians may have been pupils of Peter of Abano, namely Nicolò di

Santa Sofia¹¹⁸ and the well-known Marsiglio Mainardini, or Marsiglio of Padua, author of the Defensor pacis.¹¹⁹ The chief source of information about Marsiglio's early life is a metrical epistle addressed to him by Mussato, a poem which has been variously dated either 1312 or after 1326.¹²⁰ It relates that while the Paduan state was still intact, a phrase which has been plausibly interpreted as referring to the period before the loss of Vicenza and the beginning of the war with Can Grande in 1311-1312,¹²¹ Marsiglio had asked Mussato's advice as to whether he should study law or medicine. In reply, Mussato had accused Marsiglio of being governed by venal motives, but had expressed a preference for medicine if approached in the proper spirit. Medicine, Mussato held, was a most praiseworthy occupation if undertaken solely from a desire to know the causes and cure of human ills, and not with the intention of making money from undignified operations on the bodies of the sick. Thereafter, Marsiglio had apparently left Padua, taking his medical textbooks in his luggage, but had soon been distracted from study. Later, he returned to the study of medicine under the guidance of an outstanding doctor, who had, however, apparently advised him not to study too long when he could make a good living from practice. Marsiglio had followed this advice, and thereby shocked Mussato, who assured him that he was still young enough to mend his ways.¹²²

Unfortunately, Mussato's poem does not make clear whether Marsiglio's medical studies under the "egregium doctorum" took place at Padua, or at Paris, where he was Rector of the University in 1312-1313. However, it is to be presumed that Marsiglio would have studied medicine after, or possibly at the same time as, but certainly not before he studied arts. Medicine was universally regarded as one

V-23

of the higher faculties in the medieval schools, and it is difficult to conceive of any reason why the normal order of study should have been reversed in Marsiglio's case. He was certainly acquainted with Peter of Abano, since he is known to have transmitted a copy of Peter's Expositio Problematum Aristotelis to Jean de Jandun, who prepared a redaction of the work for use in his own lectures in the Faculty of Arts at Paris.¹²⁴ Moreover, Marsiglio was among the witnesses of a profession of Christian faith made by Peter at Padua in 1215.¹²⁵

In the light of these facts and of Mussato's poem it may therefore be possible to reconstruct Marsiglio's early academic career somewhat as follows. Advised by Mussato, Marsiglio decided at some date shortly before 1311-12 to study medicine in Paris. He completed some preliminary work in arts there, but for some reason failed to continue in the Faculty of medicine. Returning to Padua, he again took up his medical studies, possibly under Peter of Abano. If this reconstruction has any validity, Peter of Abano may well have been the professor responsible for the highly pragmatic advice of which Mussato disapproved so strongly.

Several passages in the Defensor pacis bear witness to Marsiglio's knowledge of medicine and medical practice. For example, in speaking of the proper role of priests in society, he observed that they should exercise judgment in "the same way as a physician or college of physicians," who decide whether anyone "has a bodily sickness, such as leprosy, on account of which he ought to be separated from society lest he infect others."¹²⁶ Marsiglio added that the coercive power to expel the leper belonged not to the college of physicians but to the state.

From the foregoing brief survey, it will be seen that the study

V-24

of medicine at Padua had by the first half of the fourteenth century become a complex and demanding process. There still remains, however, one branch of the medical curriculum which has not yet been touched upon, namely surgery.

At Padua, as at other Italian university centers in the Middle Ages, surgery was an acknowledged academic discipline and was studied in the schools. Doctorates and licentiates in surgery may have been granted at Padua before 1320¹²⁷ and were certainly obtained later in the fourteenth century.¹²⁸ Moreover, as will be demonstrated below, surgery was considered a science, and fully qualified practitioners were accepted as professional colleagues by physicians. All this was, of course, in striking contrast to the well-known state of affairs at Paris and other northern university centers, where surgery was considered an inferior manual skill unworthy of the attention of professional physicians, and "the separation of manual surgeons from the medical faculty was vigorously maintained throughout the fourteenth and fifteenth centuries."¹²⁹

The place of surgery in the Paduan and Bolognese scheme of medical education was well described by Dino del Garbo in the preface of his Chirurgia, or commentary on the surgical portions of the Canon of Avicenna. According to Dino, surgery is a subdivision of practical medicine, since it chiefly concerns the care of the body in sickness, one of the two branches into which practical medicine is divided. Surgery, however, continued Dino, can be of two kinds, and one of these, "manual operation on an animal body for the purpose of restoring health," cannot be held to be a science. Considered as a science, surgery can either be interpreted strictly as "the science which

V-25

teaches how to carry out manual operations on the body," or more loosely as "the science of curing those sicknesses in which some manual operation is finally required." Dino pointed out that the second, broader interpretation might be understood to include treatments by diet and medication; he added that it was in the broader sense that physicians usually understood the term surgery.¹³⁰

In the same passage Dino provided a summary of the characteristics of the perfect surgeon which throws considerable light on contemporary surgical education. According to Dino the ideal surgeon should in the first place be well grounded in the principles of medicine; second, he should have been in attendance on an expert physician (medicus) and have seen him operate and have performed operations in his presence. "For," added Dino, he who has not seen enough of anatomy cannot avoid falling into error whereby men are killed."¹³¹ The third requirement for a surgeon was that he should not be too timid in operating, but bold and confident. Dino hedged this last piece of advice with the caution that it should be interpreted with discretion, since some operations were fatal. He added that in commenting upon Avicenna's text he, Dino, had always been careful to point out which operations were especially dangerous. The physician had, however, always to be careful that the cries of the patient did not induce him to desist from operations that ought to be carried out. Fourth, the surgeon should have a light touch and be able to work rapidly, for in this way he caused less pain to his patients. Finally, to operate effectively, a surgeon needed good instruments.¹³²

The foregoing description, the author of which, it should be remembered, was one of the most highly respected physicians and

V-26

professors of medicine of his time, leaves no doubt that academically trained surgeons at Padua and Bologna themselves performed operations upon patients. It is also evident that surgery was completely integrated as a branch of medicine in these schools; that is to say, the fully trained surgeon was expected to be familiar with general medical theory, and no doubt also with the principal medical texts.

Dino del Garbo's Chirurgia was only one of a number of surgical treatises which appear to have been in use in the schools of Padua in the late thirteenth and the fourteenth centuries. Three works that were in all likelihood standard texts in the schools are incorporated in an early fourteenth-century collection of medical texts that is probably of Paduan provenance.¹³³ They are, the Chirurgia of Albucasis, the Chirurgia magna of Bruno Longoburgo, and the Chirurgia of William of Saliceto. The work of Albucasis, which was translated into Latin by Gerard of Cremona, was widely used as a textbook of surgery throughout the Middle Ages.¹³⁴ More specific links tie the other two treatises to Padua. Bruno, as already noted, wrote at Padua in the mid-thirteenth century; his work was prescribed as a mandatory text by the statutes of the University of Arts and Medicine of Bologna compiled in 1405,¹³⁵ and was probably utilized in the schools of both Bologna and Padua throughout the period with which the present study is concerned. The Chirurgia magna is chiefly noted for its advocacy of dry healing of wounds, in place of the deliberate encouragement of "laudable pus" by the use of salves and unguents as advised by other surgical writers of the Middle Ages.¹³⁶ William of Saliceto, who died before 1286, was a professor at Bologna; his work on surgery is dedicated to Bruno, rather of Dino

V-27

del Garbo, who may well have introduced the treatise to the schools of Padua.¹³⁷

As Dino himself indicated in a passage already alluded to, surgery was not studied only from books. At least as important, as Dino suggested, was the observation of the practical work of experienced surgeons. There is also a fairly strong possibility that, at least occasionally, human cadavers may have been dissected for the instruction of students of surgery and medicine. Anatomies were certainly carried out in the fourteenth century at Bologna and Venice, two cities whose practise might have been expected to influence that of Padua. At Bologna, as is well known, dissection was undertaken early in the fourteenth century, and was the subject of a famous work, the Anatomia of Mondino de' Luzzi, professor at Bologna from about 1306 until 1326.¹³⁸ In 1368 the Great Council of Venice decreed that an annual anatomy should be held at which both surgeons (medici cyrurgi) and physicians (medici phisici) should be present; two years later, the Council decreed that both surgeons and physicians should share the expenses of the anatomy, since both could gain therefrom "information about the state and conditions of the human body."¹³⁹

At Padua itself, there is no doubt whatever that anatomies constituted a normal part of medical teaching throughout the fifteenth century.¹⁴⁰ The first extant provision for an anatomy, however, dates from 1446. In that year, the College of Arts and Medicine took note of the desire of the scholars in the University of Arts and Medicine and of the doctors of the College that an anatomy should be held, and appointed two of its members to make the necessary arrangements.¹⁴¹ The statutes of the Paduan University of Arts and Medicine of 1405,

V-28

as reformed in 1496, called for an anatomy to be held annually, and referred to this practice as sanctioned by ancient statute. At the anatomy, one doctor was to read the text of Mondino's treatise, and another was to point out the parts described on the corpse.¹⁴² The mention of the work of Mondino, written in the early fourteenth century, and the reference to ancient statutes, strongly suggest that the custom of holding anatomies may go back to a considerably earlier period. There are, moreover, definite indications, that the dissection of human cadavers was practised at Padua in the first half of the fourteenth century in cases of special interest, or perhaps where foul play was suspected.¹⁴³ For example, as Professor Loris Premuda has noted, Peter of Abano's De venenis contains a reference to the dissection of the corpse of a pharmacist who accidentally poisoned himself with mercury.¹⁴⁴ Furthermore, Gentile da Foligno, who was the author of a brief criticism of the Anatomia of Mondino de' Luzzi, referred to an autopsy performed at Padua in 1341, and described a gallstone found in the corpse.¹⁴⁵ As Professor Premuda has pointed out, however, the body in question had been opened not for medical reasons, but in order to embalm it.¹⁴⁶ Nonetheless, the fact that a physician used the autopsy as an opportunity for medical research, indicates that dissection was already employed at Padua as a means of acquiring anatomical knowledge.

There also appears to be some possibility that Mondino de' Luzzi himself may have lectured on anatomy at Padua. Statements to this effect by some historians of the University of Padua¹⁴⁷ appear to be the result of a confusion between Mondino de' Luzzi and Mondino da Cividale del Friuli; but, as noted above, the separate identity of these two pro-

V-29

fessors has been established.¹⁴⁸ nevertheless, the explicit of a fourteenth century manuscript in the Vatican of the Anatomia of Mondino de' Luzzi describes that work as "the anatomy of the human body compiled by the most reverend doctor Master Mondino of Padua . . . written by Bartholomeo di Santa Sofia. . . ."¹⁴⁹ The writer, a member of the well-known Paduan medical family, became a professor of medicine at Padua soon after 1390;¹⁵⁰ one would not expect him to be mistaken about the authorship of such a well-known and relatively recent treatise. It is perhaps to be supposed, therefore, that not only Mondino da Cividale del Friuli but also Mondino de' Luzzi lectured in Padua. Slight additional evidence for some connection between Mondino de' Luzzi and Padua is further supplied by the fact that in 1310 he made himself responsible for securing a lecturer in natural philosophy from Padua for the convent of San Marco in Florence.¹⁵¹

On the basis of such scanty evidence, the possibility that the celebrated Bolognese anatomist lectured in Padua remains no more than that. That the study of surgery occupied a position of importance in the curriculum of the Paduan medical school in the first half of the fourteenth century appears, however, to be substantially established.

To sum up, while the relatively new scholastic and dialectical approach to medicine was eagerly taken up in the schools of Padua in the first half of the fourteenth century, it never appears to have displaced--nor was it perhaps ever intended to displace--the study of medicine as a practical skill.

FOOTNOTES TO CHAPTER V

1. See, pp. 211-212.

2. Peter believed that logic, natural science and astrology were more necessary for physicians than the other arts and sciences; it is clear from the whole tenor of Differentia 1 of the Conciliator, that he considered that the primary emphasis in medical education should naturally be on medicine itself. "Illi [scientiae] tamen quod medicine sunt necessariores existunt iste: logica cum sit omnium scientiarum velut sal ciborum conditive, naturalis eius principiorum ostensita, et astrologia eius indiciosus directiva" Conciliator, Diff. 1, fol. 3r).

3. The following professors of medicine and surgery at Padua before 1350 are listed by A. Gloria: Bruno da Longoburgo of Calabria (1252), Asno or Agnello (1262), Giovanni (1262), Zambonino (1262), Albertino degli Anselmi da Palazzolo (1273-1317), Avezzuto da Roncaglia (1277-ca. 1327), Matteo da Roncagette (before 1300), Peter of Abano (ca. 1306-ca. 1316--Gloria gives the dates 1303-1313, but on this see Thorndike, History of Magic, II, 873, 883), Giovanni Mondino da Cittadale del Friuli (1307-1328), Dino del Garbo (1311-1312), Pietro da Bagnoli (1318-1344), Jacopo Dondi (ca. 1343-1359). In addition, Gloria recorded as possible professors Pietro de'Guerra da Reggio (1307), Jacopo de' Zenari (1307), Nicolò da Santa Sofia (1311-1350) and Andrea Brocardo Ricinetense (ca. 1350) (Gloria, Monumenti, 1222-1318, pp. 347-368; Monumenti, 1318-1405, I, 367-376, 445-446). Of these sixteen known or possible professors, eight are known or believed to have written

F-V-2

medical works. Two of them, Peter of Abano and Dino del Garbo, were prolific authors in this field. To Gloria's list should, it appears, be added Gentile da Foligno, author of numerous medical writings, who practised in Padua from 1337 to 1345, and probably also lectured there (see p. 286).

4. There are several early editions of Bruno's treatises. That consulted for the present study was the edition of Venice, 1498 (Klebs 494.1; at the New York Academy of Medicine), in which they are printed with the Chirurgia Magna of Guy de Chauliac, and occur at fols. 83-102 and 103-105, respectively. The explicit of Bruno's Chirurgia Magna runs: "Anno ab incarnatione Domini MCCLII . . . Padue . . . Ego Brunus gente Calaber patria Longoburgensis . . . huic operi debitum finem imposui." The reference to Lazzaro of Padua is in the incipit of the Chirurgia Parva. Nothing appears to be known of Bruno's career beyond this information from his works.

5. According to A. M. Serra, the fourteenth century compilation known as Legenda Beati Philippi, which incorporates portions of the lost life of S. Filippo by his younger contemporary Pietro da Todi, says only that he was "in medicinalibus doctus." A fifteenth-century life of the saint says that he began to study medicine at eighteen, but it is only in the life included by A. Giani in his Annales Ordinis Servorum Beatissimae Virginis Mariae Centuria, compiled in 1604, that he is said to have studied philosophy at Paris and medicine at Padua (A. M. Serra, "S. Filippo Benizi," Bibliotheca Sanctorum [Rome: Istituto Giovanni XXIII della Pontificia Università Lateranense, 1964], V, 735-755 at p. 735).

F-V-3

f. According to A. Gloria, a seventeenth century portrait of S. Filippo in the bishop's residence at Padua bears the inscription, "Anno 1253 laurea philosophico (sic.) medica in hoc sacro collegio decoratus aetatis XIX" (Gloria, Monumenti, 1222-1318, p. 34).

g. The statutes of the Bolognese University of Arts and Medicine of 1405 prescribe four-year courses in medicine, practical medicine (practica) and astrology, which may perhaps be assumed to have run concurrently. In addition, a course in philosophy was outlined, with no indication as to how long it was supposed to last. (Malagola, Statuti, pp. 271-272). Whether philosophy and medicine were studied simultaneously at Bologna, or whether philosophy was taken first is not clear, nor is it necessary to assume that any consistent policy was followed in this respect (see p. 20). A four year course in medicine is also outlined in the statutes of the Paduan University of Arts and Medicine of 1405 as revised in 1408 (Statuta dominorum artistarum, 2.16, f.24v).

h. Mussato, Ad Magistrum Marsilium Physicum Paduanum, Graevius VI, part 2, cols. 33-50:

"Vidi ego, qui studii plures a tempore coepti

Chlamyde sub rubra primo medicantur in anno"

Mussato, perhaps influenced by his association with the College of Doctors of Arts and Medicine, had an extremely low opinion of physicians of this kind. According to him, their main characteristics were venality, ignorance, and lack of professional dignity. The poem continues:

F-V-4

"Nunc pullos, nunc ova simul, nunc vascula lactis
 Pro merita mercede sua sub veste reportant.
 Naturale ferunt homini, si didicit aeger:
 Si valeat, laudant medicum vox credula Vulgi."

On the dating of this poem, see p. 301 and note.

9. Rolandino, Cronica, p. 173-174. In 1261, the Commune of Padua had granted physicians and surgeons tax exempt status, but the statute made no mention of teaching or the schools (Gloria, Monumenti, 1222-1318, documents, p. 18). It was, however, issued at a time when the Commune was engaged in ratifying a number of scholarly privileges, so that some academic connection may perhaps be assumed.

10. Padua, Bibliotheca del Seminario Vescovile, cod. no. 173, 14c, unnumbered folios. The Tractatus de conservatione sanitatis compilatus a magistro Zambonino occupies the last twelve folios and begins "Sicut dicit philosophus in sermone de anima. . . ." This manuscript appears to have been omitted from E. Bertolasso, Manoscritti di Medicina esistenti nella Biblioteca del seminario Vescovile di Padova (Padua: Istituto di storia della Medicina dell'Università di Padova, Edizione Minerva Medica, 1961). Zambonino da Gaza of Cremona is named as the author of a work on medicine in F. Arisi, Cremona litterata (Parma, 1702-1706), I, 169. Another Zambonino was, however, a member of the College of Doctors of Arts and Medicine in 1359-1360 (Gloria, Monumenti, 1318-1405, II, 449), and the De conservatione sanitatis may perhaps be his.

11. According to Gloria (Monumenti, 1222-1318, p. 351), the epitaph, which is no longer extant, ran "Dominus Zamboninus de Gaza Cremonensis

IV-20a

doctor Parisiensis scientiae medicinae, . . ."

12. For the life and works of Taddeo Alderotti see Tiraboschi, Storia della Letteratura Italiana, IV, 324-332 and Sarton, Introduction to the History of Science, II, part 2, 1086-1087.

13. For Taddeo's commentaries on works of Hippocrates and Galen, see TK 1015, 1289, 750, 90, 925. He and his school showed special interest in the Aphorisms; concerning this, the reader is referred to Professor Kibre's forthcoming study of medieval manuscripts of Hippocratic texts and commentaries. Regarding Taddeo's use of Aristotle, M. Neuberger remarked that he "more than any other opened wide the portals of medicine to Aristotelian dialectic and established Aristotelian physiology as the chief foundation of medical theory" (Max Neuberger, History of Medicine, trans. E. R. Playfair, II, Part 1 [Oxford: Oxford University Press, 1925], 64-65).

14. Engelbert to Master Ulrich, Pez, Thesaurus Anecdotorum, I, col. 430 (quoted in Gloria, Monumenti, 1222-1318, p. 131): "Postquam a Padua recedens [Wilhelmus de Brixia] conventum suscepit in medicinis Bononiae sub magistro Tattheo medico praecipuo tunc ibidem." On the dating of this episode, see Fowler, Intellectual Interests of Engelbert of Admont, p. 21-22.

15. His medical works were, however, studied there. A commentary attributed to him on the fourth fen of the first book of the Canon of Avicenna is included in a medical miscellany copied at Padua in 1361 (Padua, Biblioteca Universitaria, cod. al numero provvisorio 202, fols. 117 v ff. At f.96r "Quas ego Augustinus scripsi Padue M^oCCCLXI").

F-V-6

16. For Matteo's epitaph, characterizing him as having interpreted Aristotle and Galen, see p. 70 . No works by him appear to be extant, and the statement that he wrote a commentary on the Microtegni may perhaps be merely a deduction from the epitaph, since the claim appears first to have been made in the eighteenth century (Gloria, Monumenti, 1222-1318, p. 353).

17. See p. 300.

18. Liber compilationis physiognomie (Padua, 1474, Klebs 775.1); for manuscripts see Thorndike, "Manuscripts of the writings of Peter of Abano," pp. 204-205.

19. De venenis (Mantua, 1473 and several other incunabula editions; see Klebs 773.1-2, 4-6; 774, 1-10). I have consulted the edition of Venice, 1496 (Klebs 773-6), where it is bound with the Conciliator, at the New York Academy of Medicine.

20. Printed with Mesue Opera medicinalis (Pavia, 1478; Klebs 680.7; at the New York Academy of Medicine). Mesue the Younger (d. 1015) flourished at Baghdad. The Grabedin, his principal work, is a pharmacopoeia; it was for centuries a standard work of reference in western Europe (Sarton, Introduction to the History of Science I, 728).

21. See p. 230.

22. See Lynn Thorndike, "Translations of works of Galen from the Greek by Peter of Abano," Isis, XXXIII (1942), 649-653. Peter learned Greek during his youthful visit to Constantinople. Regarding the Hippocratic work, see p. 145, note 186.

F-V-7

23. Thorndike, "Manuscripts of the writings of Peter of Abano," pp. 202-204, 206-208.

24. See Chapter II, note 88.

25. For the question of Peter's birthdate see Thorndike, History of Magic, II, 176, where the date 1250 is accepted, and Duhem, Système du Monde IV, 247, where an argument is put forward in favor of the year 1257.

26. See p. 245 and note. In addition to Gloria's summary, mention may be made of Tiraboschi, Storia della Letteratura Italiana, V, 307-316, which provides what is still one of the fullest available accounts of Dino's career. Tiraboschi, however, held that Dino's sojourn at Padua extended from 1313 to 1314, while Gloria, as already noted, believed it to have taken place in the years 1311-1312. See also, Barton, Introduction to the History of Science, III, Part I, 637-638.

27. "Grandissimo dottore in fisica et in più scienze naturali e filosofiche, il quale al suo tempo fu il migliore e sovrano medico che fosse in Italia . . ." Giovanni Villani, (d. 1348), Cronica 10.41, edited in F. G. Dragomini, ed. Croniche storiche di Giovanni, Matteo e Filippo Villani (Milan, 1848), III, 42. The foregoing passage is cited in Salvatore de Renzi, Storia della Medicina in Italia (Naples, 1845-1848), II, 226. Filippo Villani (d. 1405) included Dino del Garbo among the illustrious men of Florence and wrote his biography. See Filippo Villani, Le vite d'uomini illustri Fiorentini, ed. G. Mazzuchelli (Venice, 1747), p. 46-48.

F-V-6

20. It is printed as Dinus super quarta fen primi [Canonis] (Venice, 1522). A copy is in the possession of the British Museum (British Museum General Catalogue of Printed Books, LXXXI [1961], col. 600, 597.1.11[2]), but I have not seen it. For manuscripts, see TK 283.

21. . . . Dino de Florentia Expositio super . . . et a fen Avicenne et super parte quinte (Ferrara, 1483; Klebs 356.1; I have consulted the copy at the New York Academy of Medicine).

22. Barton, Introduction to the History of Science, III, Part I 277-281. See also Giovanni Villani, Cronica, 1331, p. 94.

23. According to the proemium of the Dilucidatorium, as cited by Gloria (Monumenti, 1277-1281, p. 30), "Ventus ad studium reparandum a Communi Padue ibi letens nec opus reincepti."

24. All of these works have been printed. For editions, see Barton, Introduction to the History of Science, III, Part I, 277-281. For the numerous manuscripts of these and other writings by Dino, the reader is referred to the index of TK.

25. De ponderibus et mensuris, printed with Dino del Garbo, Expositio super . . . et a fen Avicenne et super parte quinte (Venice, 1483; Klebs 356.2). See M. C. Wellborn, "Studies in medieval metrology: The De ponderibus et mensuris of Dino del Garbo," Isis, XXIV (1933-1934), 15-36.

26. For Mondino's career and writings, see Gloria, Monumenti, 1222-1316, pp. 599-562; P. Someda de Marco, Medici Forojuliensi dal secolo, XI

F-V-9

XVIII (Udine: Edizione "Il Friulo Medico," 1963), pp. 14-21; and Sarton, Introduction to the History of Science, III, Part 1, 840.

15. Sarton, ibid. For Mondino de' Luzzi, see p. 306 and note 138.

16. Mondino's supplement to the Synonyma has apparently never been printed; for manuscripts see TK 1397. For a description of this work and for an account of the work of Simone da Cordo on which it is based, see L. L. Mackinney, "Medieval medical dictionaries and glossaries," Medieval and historiographical essays in honor of James Westfall Thompson, ed. J. L. Gage and E. N. Anderson, (Chicago: University of Chicago Press, 1948), pp. 250-268.

17. Nicolo may have been simply a practising physician in Padua and not a professor. See Gloria, Monumenti, 1222-1318, pp. 367-68. For manuscripts of his Receptae see TK 722, 1102, 1124.

18. P. P. Vergerio (d. 1447), Vitae Carrarensium Principum. Muratori, RIS XVI (Milan, 1750), 143. Ubertino became ruler of Padua in 1336.

19. For Gentile's life and works see G. Girolami, Sopra Gentile da Fuligno (sic.), medico illustre del secolo XIV (Naples, 1844); Thorndike, History of Magic, III, 233-252; and Sarton, Introduction to the History of Science, III, part 1, 138-152. Both the last named authors include bibliographical references to secondary material concerning Gentile, and Sarton gives a bibliography of his numerous printed works. For manuscripts of Gentile's writings see the multitude of entries indexed under his name in TK. Although there appears to be no

F-V-10

contemporary documentary evidence to show that Gentile lectured in the schools at Padua, all the authors mentioned hold that such was probably the case. In any event, the presence of such a distinguished physician and medical author must surely have influenced the study of medicine in the city. Concerning his admiration for Peter of Abano, the story is told that, on arriving in Padua, Gentile fell on his knees in the room where Peter had taught, crying "Hail, Holy Temple" (Girolami, Supra Gentile da Fuligno, p. 10).

40. Expositio in secundum librum Canonis Avicenne (Pavia, 1482; Klebs 461.1); Expositio in tertium librum Canonis Avicenne (Padua, 1482; Klebs 462.1); Expositio in primam et quartam librum Canonis Avicenne (Padua, 1482; Klebs 463.1); Expositio super quinta Canonis Avicenne ([Pavia, 1482?]; Klebs 464.1); quaestiones subtilissimae in artem parvam Galeni (Venice, 1482); Carmina de urinarum iudiciis edita ab . . . Magistro Egidio cum expositione et commento magistri Gentilis de fulgineo (Leiden, 1526; Columbia University, Special Collections, B10.Ae.25).

41. For example, Consilia ([Pavia, 1482?]; Klebs 455.1); see also **TK** 661,262,1349,715,437-438,739,641,455,1347 and many other entries.

42. Kibre, Scholarly Privileges, p. 65 and notes.

43. Chart. Univ. Paris., II, 56, no. 1100.

44. Antonio Lio and Jacopo d'Arqua (Gloria, Monumenti, 131^a-140^a, I, 370-371 and 375-376).

45. See pages 155-156.

F-V-11

46. Liber Aggregationis sive Aggregator Paduanus de Medicinis Simplicibus (Venice, 1481; Klebs 349;1). A copy is in the possession of the New York Academy of Medicine.

47. See page 13.

48. A brief summary of their careers and writings is to be found in Gloria, Monumenti, 1318-1405, I, 381-386, 390-395.

49. Gloria, Monumenti, 1318-1405, II, 385. For one little that is known of Benedetto's career, see ibid., I, 98-100.

50. The list as printed by Malagola makes confusing reading; it may most conveniently be consulted in Lynn Thorndike, University Records and Life in the Middle Ages (New York: Columbia University Press, 1944), pp. 279-282, where it is translated into English and set out in tabular form.

51. Statuta dominorum artistarum, 2.1v, f.24v.

52. Thomas Aquinas, Division and Method of the Sciences, p. 4, "The science of medicine is a branch of physics."

53. Conciliator, Diff., 3, fol. 7r and v, entitled in the table of contents at fol. 255r "An medicina sit scientia"; Diff., 5, fols. 7v-8v, "An medicina sit artium preclarissima," At fol. 8r "[Medicina] confert etiam in bonorum acquisitionem fortune. . . . Medicine artis scientia inter excellentiores est: artibus ceterisque maior utilitate et maioris periculi. . . ." Neuberger, History of Medicine, II, Part 1, p. 50, notes that it was largely the introduction of speculative and philosophically oriented Arab medical works,

F-V-12

particularly those of Avicenna, that led to increased emphasis on the concept of medicine as one of the speculative sciences in the late thirteenth and fourteenth centuries: "Arabic influence forced western medicine to join forces with philosophy." Peter of Abano himself, Neuburger regarded as "the model for all later medical dialecticians" (*ibid.*, p. 17); yet Peter's reasons, just quoted, for the superiority of medicine seems quite practical.

54. Thomas Aquinas, Division and Method of the Sciences, p. 12.

55. St. Thomas, however, pointed out that the division of medicine into theory and practice was different from the similar division of the other arts and sciences. "For when we distinguish philosophy or the arts into theoretical and practical we must do so on the basis of their end, calling that theoretical which is directed solely to the knowledge of the truth, and that practical which is directed to operation. . . . [but] on that basis the whole of medicine is practical, since it is directed to practice. But the above division is made on the basis of whether what is studied in medicine is proximate to or remote from practice" (*ibid.*, pp. 14-15).

56. "an medicina sit theórica vel practica" (Conciliator, Diff. 6, fol. 7r and 7v).

57. Gloria, Monumenti, 1518-1545, II, 252, document of May 2, 1391, "Geronimi de Anzeleris de Venetiis doctoris arcium et medicine legentis practican medicanam"; and Statuta dominorum aristarum, 2.4, fol. 21v, which provides for the appointment of extraordinary professors of practica.

F-V-13

58. The Canon of Avicenna is divided into five books, the first of which is a general treatise covering the topics of the science of medicine, human anatomy, disease and its symptoms, regimen and remedies. There are numerous manuscripts and early editions of the Latin version generally in use in the Middle Ages. I have consulted the edition of Venice, 1486 (Klebs 141.1) at the New York Academy of Medicine.

59. The medieval Latin versions of the Aphorisms and Prognostications are printed in the popular collection of medical tracts known as the Articella (Venice, 1487; Klebs 116.1; at the New York Academy of Medicine). On the extensive use of these works in the Middle Ages, see E. Kibre, "Hippocratic writings in the Middle Ages," Bulletin of the History of Medicine, XVIII (1933), 350-364.

60. The Latin versions of these treatises are printed in Galen, Opera (Venice, 1490; Klebs 442.1). For manuscripts, see TK 422, 432, 1376; 487, 490, 492, 1511; and 429, 1253, 1257.

61. The Colliget, a medical encyclopedia, is printed with the Liber Teisir of Avenzoar (Venice, 1496; Klebs 127.2; at the New York Academy of Medicine).

62. The Microtegni, or Ars Parva, of Galen is also among the treatises included in the Articella (Venice, 1487).

63. The statement that the Colliget was translated at Padua by the Jew Bonacosa in 1255 occurs in the explicit of Cesena, Biblioteca Malatestiana, Cod. Plateo XXV, IV; see J. M. Mucciolo, Bibliothecae Malatestianae Catalogus (Cesena, 1700), p. 88; and M. Steinschneider,

Die Hebraischen Übersetzungen des Mittelalters und die Juden als

Dolmetscher (2 vols. in 1, Graz: Akademische Druck u. Verlagsanstalt, 1956, being a reprint of the edition of Berlin, 1893), II, 672. However, Sante Ferrari, I tempi, la vita, le dottrine di Pietro d'Abano, p. 86, gives the date as 1289. I have not seen the manuscript in question.

64. Malagola, Statuti, p. 276.

65. See p. 285.

66. See pp. 303-304.

67. Turiseni monaci plusquam commentum in Microtegni Galeni.

Cum questione eiusdem de ypostasi (Venice, 1512), consulted at the New York Academy of Medicine. There are also incunabula editions (Klebs 983.1-3). The Plusquam commentum certainly deserves its title if length is the criterion; in it each brief section of Galen's short text is accompanied by a voluminous scholastic disquisition pro and contra. On the career of Turisanus see Neuberger, History of Medicine, (Oxford: Oxford University Press, 1925), II, Part 1, 119.

68. Gloria, Monumenti, 1318-1405, II, 385.

69. Statuta dominorum artistarum 2.16., fol. 24v.

70. On theoretical medicine in the writings of Gentile da Foligno, see Thorndike, History of Magic, III, 233-252; for an example of the combination of philosophical and medical notions in the theoretical writings of Dino del Garbo, see above, pp. 245-246.

F-V-15

71. Expositio Problematum Aristotelis, Particulae, 2-9, 11-13, 11-38. The particula on sympathetic action (*compassio*) groups together questions on such matters as the tendency to yawn when others yawn, feel pity when others suffer, and fall ill after being near the sick. Peter's commentary therein distinguishes, as the text does not, between voluntary and involuntary action (Expositio Problematum Aristotelis, c.1. 2.5).

72. Ibid., c.1.

73. Ibid., c.2.

74. Ibid., c.3.

75. Ibid., c.4.

76. Ibid., 2.10; 1.1.

77. Ibid., c.5.

78. Ibid., c.6.

79. Ibid., c.7.

80. Ibid., c.8.

81. Ibid., 2.11.

82. Ibid., 1.52; 1.96. Medieval physicians inspected urines for "figures" which were supposed to reflect the patient's condition.

83. Ibid., 1.1.

F-V-16

84. Ibid., 1.22.

85. "An dolor possit esse morbus" (Conciliator, Diff. 73, fols. 107-108).

86. "An nervi oriantur a cerebro vel corde." (ibid., Diff. 41, fols. 58-59).

87. "An vene oriantur ab epate vel corde." (ibid., Diff. 47, fols. 65-67).

88. "An caput parvum sit melius signum magno." (ibid., Diff. 79, fols. 115-116).

89. "Principium motus primum quidam nervis; per ipsos autem musculis datur" (ibid., Diff. 58, fol. 82r). It appears, however, that Peter like other pre-Vesalian writers did not distinguish between nerves and tendons.

90. Indeed, both the Conciliator and the Expositio Problematum Aristotelis of Peter of Abano might be regarded as falling into this category. On the general history of medical problem literature in the Middle Ages, see Brian Lawn, The Salernitan Questions: An introduction to the history of medieval and Renaissance problem literature (Oxford: Oxford University Press, 1963). The work of Peter of Abano is discussed at pp. 92-98.

91. Apparently printed, Venice, 1576 (Barton, Introduction to the History of Science, III, Part 1, 850).

92. Printed with his commentary on the first ten of the fourth

F-V-17

book of the Canon, Padua, 1476 (Klebs 446.1).

93. Questiones de prolongatione febris (Padua, 1486). See W. A. Copinger, Supplement to Main's Repertorium Bibliographicum (Milan: Gorlich Editore, 1950), no. 2653; apparently not in Klebs, unless equivalent to De febre ([Padua, 1477?]; Klebs 448.1).

94. Padua, Biblioteca Universitaria, cod. al numero provvisorio, 202.

95. "Utrum motus oculorum sit naturalis vel animalis." (ibid., fol. 12v).

96. "Utrum aliqui egritudo possit esse hereditaria." (ibid., fol. 16r).

97. "Utrum in colica competant stupefaciencia et arguitur quod non." (ibid., fol. 47r). (This is also the topic of Diff. 204 of the Conciliator, from which it may be taken.)

98. "Utrum vulnereus [sic] ulcerus pulmonis sit curabile." (ibid.)

99. Bartolomeo da Varignana (d. 1318) was a physician and professor of medicine at Bologna, and the principal rival of Taddeo Alderotti. He performed one of the earliest recorded autopsies in the year 1302 (Barton, Introduction to the History of Science, III, Part 1, 841). For other manuscripts of questions debated by Dino del Garbo, see TK 1647, 1651, 1675.

P-V-18

100. Padua, Biblioteca Universitaria, cod. al numero provvisorio 202, fols. 3r-10v.

101. Gentile da Foligno was a particularly prolific author of consilia, but he was by no means the only one. See, for example, TK 145, for a consilium by Dino del Garbo.

102. Padua, Biblioteca del Seminario, cod. 174, p. 1. See also Thorndike, History of Magic, III, 247-248 for further discussion of this and other consilia of Gentile.

103. Padua, Biblioteca del Seminario, cod. 174, pp. 22, 10.

104. The text of this consilium is edited with a translation in Lynn Thorndike, "A case of snake-bite from the consilia of Gentile da Foligno," Medical History, V (1911), 90-95.

105. Gentile's principal consilium on the pest is edited in Earl Bodhoff, 'Betrachtungen über Pestätiologie und Pestprophylaxe, beschrieben während der Pestepidemie von 1348,' Archiv für Geschichte der Medizin, V (1911), 84-87. Its contents are discussed in A. M. Campbell, The Black Death and Men of Learning (New York: Columbia University Press, 1931), mainly at pp. 9-13, 37-38, 60. The author points out that Gentile considered the ultimate causes of the plague to be astrological, but preferred to concentrate his discussion on immediate causes, regimen, and remedies, insofar as they existed. He allowed the possibility of infection, but gave more weight to corruption of the air as a cause.

106. See also Thorndike, History of Magic, III, 248-249, where

F-V-19

it is noted that Gentile occasionally made use of such ingredients as crabs, turtles, and goat-dung in his medicines, although more often employing herbs and spices.

107. Mackinnay, "Medieval medical dictionaries and glossaries," p. 260.

108. See pp. 229-233.

109. See p. 283.

110. For the manuscripts of the Medicamenta, or De virtutibus medicamentorum of Dino del Garbo, see TK 641, 1438, 1627, 1687. According to TK, 1438, it appears to have been printed under the title Comm. supra secundi Canonis Avicenne (Venice, 1549), and should therefore perhaps be classified as a commentary. The second book of the Canon consists for the most part of a list of herbal and other substances used in medicine.

111. For manuscripts, see TK 741, 948. Sarton (Introduction to the History of Science, III, Part I, 851) notes, however, that "The Recepta printed under Gentile's name were compiled by his younger contemporary Bernard Alberti."

112. Mackinney, "Medieval medical dictionaries and glossaries," p. 269. This article refers to the Aggregator, the Enumeratio remediorum and the Promptuarium medicine as three distinct works. However, the Promptuarium, to which I have been unable to secure access, is identified with the Aggregator in TK and in G. Tanfani, "Jacopo Dondi,

F-V-20

Medico padovano del Trecento, ed il suo metodo di estrazione del sale dalle acque termale," Rivista di storia delle scienze mediche e naturali, XXVI (1935), 1-23, at p. 20. Jacopo Dondi Patavini. . . . Enumeratio remedium simplicium et compositum ad affectus omnes qui a chirurgo curantur is printed in the Thesaurus chirurgiae edited by F. Uffenbach (Frankfurt, 1611; consulted at the New York Academy of Medicine), pp. 1021-1022, but appears to correspond with the section of the Aspurgator beginning on fol. 210r.

113. Most of these authors and their works have already been alluded to. Rhazes, or al-Rāzī, who flourished in Baghdad and died ca. 925, was the author of the so-called Continens, a medical encyclopedia, and of the popular Liber Almansonis, a general work on medicine in ten books, as well as of numerous other medical writings. See Barton, Introduction to the History of Science, I, 100-101.

114. Petrarch was intermittently resident in Padua, where he held a canonry of the cathedral, from 1352 until his death in 1374 (Ernest H. Wilkins, Life of Petrarch [Chicago: University of Chicago Press, 1911], p. 62 ff.). Among his correspondents were Giovanni Dondi, son of Jacopo Dondi and professor of medicine at Padua, and Tommaso del Garbo, son of Dino and author of a massive Summa Medica incorporating Dino's teachings (Ernest H. Wilkins, Petrarch's Correspondence [Padua: Editrice Antenore, 1901], pp. 11, 20).

115. Lettere senili di Francesco Petrarca, ed. G. Fracassetti, (Florence, 1892) I, 287-288: "Così fra i medici chi a furia di esperimenti e di prove mette più vite in pericolo, questi (sic) mostrato

P-V-21

a dito e più celebrato, e dagli altri tenuto a duce e maestro. Gran pratica, dicono, grande esperienza è la sua: il che significa aver egli contratta l'abitudine di ammazzare con securtà."

116. "Medicus medicatorum non efficitur perfectus nisi per duas virtutes. Quam una est virtus super universalia et canones que acquiritur ex libris medicine et altera virtus que advenit per longitudinem frequentie actionum medicine in egris." (Conciliator, Diff. 4, fol. 7v). "Non verbo sed opere medicus . . . non sit valde pulcher . . . ut de eorum mulieribus ab eo perterreantur egrotantes" (Diff. 2, fol. 4r).

117. See M. C. Wellborn, "The long tradition: A study in fourteenth century medical deontology," Medieval and historiographical essays in honor of James Westfall Thompson, ed. J. L. Cate and E. N. Anderson (Chicago: University of Chicago Press, 1938), p. 344-357 for examples of similar passages in the writings of Jan Yperman, Guy of Arderne, Guy de Chauliac and Henry de Mondeville.

118. See p. 386 and note 37.

119. On Marsiglio's career and writings see A. Gewirth, Marsilius of Padua the Defender of Peace (New York: Columbia University Press, 1951) and bibliography therein contained; and the introduction to Marsilius of Padua, Defensor pacis, ed. C. W. Previté-Orton (Cambridge: Cambridge University Press, 1928).

120. The date 1312 has been generally accepted, but C. W. Previté-Orton argued for a date after Marsiglio's flight to Germany in 1326 (Defensor pacis, Introduction, p. ix.)

F-V-22

121. Ibid.

122. Me, bene si recolis, Paduae dum regna manerent,

Consilii ignarum quamquam de pondere tanti

quaesiti, num te leges audire forenses

Malueris, medicae potius intendere Physis?

Respondi, cor cerno tuum, tua viscera torrent

Auri sacra fames, et avaro vivere quæstu

.

Te vendere voces

Una tuas roset strepitu pulmonis anelli,

Altera venales operas ad corporis aëri

Disponens curas, turpes viles et in artes.

.

Verum sumpta tibi Physis virtutis amore,

Ut tu sponte velis ejus discernere vires,

Mortuosque hominum causas, illisque mederi,

Illa deo est, pariterque homini laudabilis omni.

.

Tu tecum, et pingui patria suffultus amicis,

Et patrum et populi dulci discessus amore

Commoda cum medicis portas alimonia libris.

.

redis ad vota prioris

Consilii, rursus redit in praecordia primus

Interruptus amor studii, quod mente gerebas.

Vadis ad egregium Doctorem temporis hujus,

F-V-23

Teque locas lateri, carptimque volumina Physis

Decurrens perhibes, imo quae sumpseris haustu.

Quid quod vita laus longae non sufficit arti

Vafer, ait, nostro studio repleta bienni.

.....

Festile tempus habes pulchra florente juventa.

Quo te restituas, si te revat insita Virtus.

Mussato, Ad Magistrum Marsilianum Physicum Paduanum, Gracilis, VI. Part.
2, cols. 40-41.

125. Jewirth, Marsilius of Padua, p. 20.

126. Marsilius's role in transmitting the work is acknowledged in the preface of Jean de Jandun's redaction, of which several manuscripts are in existence. See Histoire Littéraire, XXX (1400), 354-356, TK [sic] and Lawn, The Salernitan Questions, p. 15. The Expositio Problematum Aristotelis was, as noted, finished in 1410; Marsilius could therefore either have taken it with him on his first trip to Paris, before 1410, or on his subsequent journey there after 1410 (Defensor pacis, Introduction, p. 3 ff.)

127. Jewirth (Marsilius of Padua, p. 21), citing Peter's profession of faith as printed in G. Ronzoni, "Della vita e delle opere di Pietro d'Abano," p. 300, where the list of witnesses includes "Magister Marsilio quondam domini Bonithi de contrate Sancte Lucie de Padua." Marsiglio's name is, however, omitted from the profession of faith as printed in Gloria, Monumenti, 1222-1318, documents, 1-2.

F-V-24

126. "quemadmodum medicus aut medicorum collegium iudicio primae significationis iudicare habent de morbo corporali, propter quam debet quis ne alios inficiat, ut leprosus, ab aliorum consortio separari" (Defensor pacis, 2nd ed., p. 166-167).

127. See p. 21 and note 101.

128. See, for example, Florio, Monumenti, 1317-1405, II, 177, document of March 1, 1317: "licentiate in iuribus et doctor Nicolaus de Geronville, who flourished 'usque ad hunc interuentum in studiis paduanis continue moras traxit studiis gracie insistendo'; ibid., II, 250, document of January 1, 1341: "pres. mag. Johannes medicus in civitate doctoratus"; ibid., II, 177, document of October 14, 1333, licentiate in surgery of Antonio di Piacentia. It was not, however, necessary to possess a doctorate in order to practice surgery at Padua. For this, membership in the city Fratalea, or guild, of Physicians and Surgeons was required (Kibre, Scholarly Privileges, p. 10-1).

129. Kibre, "The Faculty of Medicine at Paris, Charlatanism and Unlicensed Medical Practices in the Later Middle Ages," p. 96, where attention is drawn to the case (1307) of Johannes de Pisis, a surgeon who had operated manually before his acceptance into the Parisian Faculty of Medicine. He was made to swear that he would no longer do so at Paris. The name of this surgeon perhaps suggests that he may have been of Italian origin; that the superiority of Italian methods of surgical training was implicitly recognized even in localities where surgery was forbidden to physicians of professional dignity is perhaps

F-V-25

to be deduced from the fact that a certain John of Padua was surgeon to King Philip IV of France in 1301 (ibid., p. 6).

130. "Cirurgia spectat maxime ad partem practice que vocatur scientia medicandi et operandi exritudines. . . . [Strictly interpreted, it is] scientia docens modum et qualitatem operandi cum operatione manuali solum in corpore animalis. . . . [Loosely interpreted, it is] scientia curationis exritudinum in quibus finaliter accidit operatio manualis." Expositio super 2 et 4 ten Avicenne et super parte quinte, sig. A2r.

131. "Ut chirurgicus sit in se perfectus etiam ad operandum primo requiritur ut sit instructus in principis medicine; secundo requiritur ut cum experto et perito medico steterit et eum viderit operari et apud eum ipse idem fuerit operator. . . . quoniam qui non est sufficiens videre anathomiam non evadit quin cadat in errorem quo interficiuntur homines." (ibid., sig. A2v).

132. "Non sit timidus in operando sed audax et securus. . . . habeatur manus levis et expedites, quia tunc operatio et tactus sit cum minori clamore vel dolore. . . ." (ibid.).

133. H. J. Hermann, Beschreibendes Verzeichnis der illuminierten Handschriften in Osterreich. Die Italienischen Handschriften des Dugento und Trecento, I, Bis zur Mitte des XIV Jahrhunderts (Leipzig, 1928), p. 25, no. 23, cod. 2301, 14c, identified as probably Paduan. I have not seen this manuscript.

F-V-26

134. Albucasis (Abū-L-Qāsim) who flourished at Cordova and died ca. 1013, was the leading Muslim writer on surgery. He was largely responsible for the vogue for surgical treatment by cauterization in preference to incision (Sarton, Introduction to the History of Science, I, 161-162).

135. "Omni anno in principio studii incipiant legere pro prima lectione Cirugiam Brunī . . ." (Malazola, Statuta p. 247-248).

136. See Neuberger, History of Medicine, p. 66-67. On the whole, the physicians of Salerno favored the encouragement of suppuration, while those of Bologna, notably Hugo of Lucca (d. before 1258) and his son Theodorico (d. 1277) were in favor of dry healing. There were, however, also advocates of suppuration at Bologna.

137. The little that is known of William's life is summarized, and extensive extracts from his work are printed in Italian translation, in M. Tabanelli, La Chirurgia Italiana nell'alto Medioevo (2 vols. Florence: Olshki, 1965), II, 497-799. See also Neuberger, History of Medicine, II, Part 1, p. 67-68. William advocated the use of the knife in surgery which, owing to Arab influence, had largely fallen into disuse.

138. Mondino was a pupil of Taddeo Alderotti. For the few facts known about his life, see Wellborn, "Mondino de' Luzzi's commentary on the Canones Generales of Mesue the Younger," Isis, XXII (1934), 8-11, and Sarton, Introduction to the History of Science, III, Part 1, 842-845. Mondino's Anatomia has been many times printed. The most recent printing

F-V-27 of the Latin text is E. Wickersheimer, Anatomies de Mondino de' Luzzi et de Guido da Vigevano (Paris: Editions E. Droz, 1926), which is a facsimile of the Pavia edition of 1478. An English translation of Mondino's Anatomia, with helpful introductory material, appeared in Charles Singer, ed., The Fasciculus di Medicina, Venice, 1503 (2 vols., Florence: R. Lier, 1925), I, 45-112. For manuscripts, see TK 1217, 1233, 1306, 1511.

139. "Dictus dux et omnes infrascripti consiliarii declararunt quod dicte expense omni anno pro dicta notomia comuniter fiant per medicos physicos et cyrugicos, contento quod physici et cyrugici videndo ipsam notomiam comuniter informari possunt de statu et condicionibus humani corporis" (Archivio di Stato de Venezia, Maggior Consiglio: Deliberazioni, 19, Novella [1350-1384], fols. 114v-115r).

This and other documents pertaining to medieval anatomies at Padua and Venice are printed at the end of the useful article of L. Premuda and G. Ongaro, "I primordi della dissezione anatomica in Padova," Acta Medicae Historiae Patavina, XII (1965-1966), 117-142, where it is pointed out that several earlier authors have mistakenly attributed the document just quoted to the year 1308, instead of to the correct year, 1368 (ibid., p. 128).

140. Ibid., pp. 132-133, citing evidence from the works of Leonardo da Bertipaglia and Galeazzo di Santa Sofia, both professors of medicine at Padua in the first, second and third decades of the fifteenth century.

F-V-28

141. Padua, Archivio Antico dell'Università, cod. 309, Acts of the College of Doctors of Arts and Medicine, fol. 147 r and v, printed in Premuda and Ongaro, "I primordi della dissezione anatomica in Padova," p. 141.

142. Statuta omnium artistarum, 1492, fol. 147v. Printed in Premuda and Ongaro, "I primordi della dissezione anatomica in Padova," p. 142.

143. A Paduan statute of 1492 provides for the appointment of a public surgeon (Moris, Monumenti, 1316-1405, II, 31), and even earlier, in 1296, a public charge had been laid upon physicians to care for the wounded. At Bologna and Venice, as Professors Ongaro and Premuda point out, the original reason for permitting dissection was probably medical-legal rather than purely scientific, and the same may well have been true at Padua. See Premuda and Ongaro, "I primordi della dissezione anatomica in Padova," pp. 140-141.

144. Ibid., p. 141, citin De venenis, 1 (fol. 20v in the edition of Venice, 1496).

145. Premuda and Ongaro, "I primordi della dissezione anatomica in Padova," p. 140, citin Gentile da Foligno, Amittio que est reprobatio aliquorum dictorum Mundini in anathomia prescripta, printed with Mondino, Anathomia corporis humani (Leipzig, ca. 1490). This edition (Klebs 188.6) is available at the New York Academy of Medicine, Gentile's Reprobatio Mundini occurs at sig. E/v-8r. However, no reference to an autopsy or the year 1441 appears to occur therein. No doubt the

F-V-29

reference in question is to be found in some other work of Gentile's.

146. Premuda and Ongaro, "I primordi della dissezione anatomica in Padova," p. 132.

147. For example, E. Mopurgo, "Lo studio di Padova, le epidemie ed i contagi durante il governo della Repubblica Veneta," Memorie e documenti per la storia della Università di Padova (Padua, 1922), I, 117.

148. See p. 285, note 35.

149. Biblioteca Vaticana, cod. Pal. 1298, 14c, fols. 1r-15r. Inc. "Quia ut ait Gal. septimo therapeutice. . . ." At fol. 15r: "Et ex hoc est huius doctrine dictum completum que de de [sic] humani corporis anathomia a reverendissimo doctore magistro Mundino Paduano . . . compilata. Per me Bartholomeum de Sancta Sophia scriptus. . . ." My attention was drawn to this manuscript by Professor Kibre.

150. G. Tanfani, "Una illustre famiglia di medici Padovani nel medio evo," Revista di Storia di Scienze Mediche e Naturali, XXIV (1933), 97-112, and Gloria, Monumenti, 1318-1405, I, 411-413.

151. G. Zaccagnini, "La vita dei maestri e degli scolari nello Studio di Bologna nei secoli XIII e XIV," Biblioteca del Archivum Romanicum, Series 1, V (Geneva, 1926), p. 37. The relevant document is printed at p. 162-163: "M. Uguitio quondam Gillii de capella Sancte Crucis de Padova promisit . . . ire ad civitatem Florentie et ibi in loco dictorum fratrum legere et docere studentibus de conventu dictorum fratrum philosophiam naturalem per spacium unius anni . . . Mag. Mundinus,

F-V-50

filius domini Nerii domini Albici Rencii (sic) de . . . Bononia . . .
 se principalem constituens . . . [promisit] . . . quod dictus mag.
 Uguccio omnia et singula suprascripta . . . firma et rata habebit. . . ."

This document may, of course, reflect no more than a personal friend-
 ship between Mondino and Uguccio.

C-1

CONCLUSION

It has been demonstrated in the foregoing pages that all seven liberal arts, natural philosophy, metaphysics, and medicine and surgery were studied by scholars of "arts and medicine" at the studium of Padua in the thirteenth and first half of the fourteenth centuries. Obviously, not all these subjects were studied in the same depth; it seems likely that future physicians, who probably constituted the majority of the students of arts, concentrated mainly upon logic and astrology in addition to the various branches of medicine. The study of medicine itself probably held the position of chief importance in the curriculum, for in the early fourteenth century, Padua was already the home of a distinguished medical school. Yet the existence of a well-known circle of poets and literary humanists at Padua in the late thirteenth and early fourteenth centuries surely in itself suggests that grammar, rhetoric and the poets were not neglected in the schools. The legal connections of the Paduan poets and humanists do not vitiate this argument, since rhetoric was regarded as an important preparatory study for future lawyers and notaries.

It also appears that in the period discussed Padua was in close contact with other European intellectual centers, most notably Paris and Bologna. Numbers of masters and students travelled between Padua and one or other of those cities; and general intellectual trends and individual works originating in Paris or Bologna manifested their influence in Padua with sometimes startling rapidity. Padua before 1350 was not yet, of course, the unique center of scientific activity that it

C-2

later became, but it was well within the mainstream of European intellectual development. Furthermore, the beginnings of what must surely in some sense be regarded as a characteristically Paduan emphasis upon Aristotelian logic, natural or physical science, astrology, and medicine already foreshadowed the direction of the future development of the Paduan schools.

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Omitted here are minor writings of Paduan authorship, alluded to in passing in the text without description of their contents. Similarly, standard medieval school texts, such as the Physics of Aristotle, the Sphere of Scaro-bosco, and the Aphorisms of Hippocrates, which have been shown in the course of this study to have been utilized at Padua, do not appear in the bibliography. For information regarding manuscripts and editions of works in these categories, the reader is referred to the works of Klebs, Sarton, and Thorndike and Kibre, noted below. The abbreviation TK, used to identify manuscripts in the footnotes and bibliography of the present work, refers to the catalogue by Thorndike and Kibre.

B-2

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B-3

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B-15

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B-16

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B-17

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B-13

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B-25

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R-24

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B-25

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