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SYRINGEAL COMPLEXITY AND THE ORDINAL RELATIONSHIPS OF "HIGHER" BIRDS

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Syringeal Complexity and the Ordinal Relationships of "Higher" Birds

by

Peter F. Cannell

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

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ABSTRACT

Syringeal Complexity and the Ordinal Relationships of "Higher" Birds

by Peter F. Cannell

Principle Advisors: Dr. Max K. Hecht and Wesley E. Lanyon

Systematic study of the avian syrinx has had a long but imbalanced history. Nineteenth century avian systematists routinely examined syringes in their attempts to define a higher-level classification for birds but the passerine syrinx, possessing more complex musculature, received most attention. This emphasis has continued; although the structure of passerine syringes has been recently reviewed in detail, there has been virtually no systematic comment on the syringeal morphology of nonpasserines in this century. Here, I describe syringeal morphology of several orders of "higher" nonpasserines and discuss the implications for the phylogeny of "higher" birds, including the Passeriformes in which syringeal morphology is so well known. The examination and interpretation draw on a broad comparative examination of syringeal morphology, including

over 600 specimens representing 57 families and 22 orders of nonpasserine birds.

Passerine-type syringeal complexity is reported for several nonpasserine taxa: intrinsic syringeal muscles are described for kingfishers, hummingbirds, parrots, and colies; internal cartilages are reported for motmots, hummingbirds, and colies. Some of these features are reported here for the first time, others were last noted in the early nineteenth century. The phylogenetic implications of structures are tested and discussed. Although an association of Passeriformes and Piciformes is one of the most accepted ornithological traditions, a review conducted here finds no support for that relationship. Two shared derived characters of the syrinx imply a relationship between parrots and colies and corroborate a previous suggestion based on hind limb musculature. The possible homology of features in nonpasserines with those in passerines is discussed. The presence of intrinsic muscles in the primitive passeriform syrinx is found to be equally as parsimonious as traditional assumptions of independent derivations.

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INTRODUCTION

Systematic study of the avian syrinx has had a long and fruitful history, starting in 1847 with descriptions by Johannes Müller. Subsequent nineteenth century anatomists (e.g., Garrod 1877-1878; Gadow 1892; Beddard 1898) routinely examined the syrinx in their attempts to determine familial and ordinal level relationships of birds. Because current avian classification is largely adopted from these early investigations, the organ has had significant indirect influence on contemporary views of avian relationships.

The passerine syrinx, with its more complex musculature, received particular attention and was the subject of a comprehensive morphological review by Ames in 1971. In contrast, there has been virtually no systematic comment on the nonpasserine syrinx in this century. A contributing reason may be a perception of lesser complexity and species-level variation in the nonpasserine syrinx. In the twentieth century, avian taxonomists have concentrated on questions of species limits and intraspecific variation, to the detriment of higher level systematics and anatomical studies. An 1898 review by Frank Beddard remains the best source of nonpasserine syringeal anatomy, and perhaps of nonpasserine anatomy in

general.

Here, I present some results from a broad systematic comparison of nonpasserine syringeal morphology. The taxonomic emphasis is on those families and orders that may hold a close relationship to the passerines, in which the syrinx is so well known. The first part of this thesis deals with syringeal terminology. Usage has not been consistent and resultant misunderstandings of the actual distribution of some characters may have occurred. Particular terminological recommendations are made.

The second part reviews the characters traditionally purported to support a sister-group relationship between Passeriformes and Piciformes. Although this association is one of the most acceptedd ornithological traditions, my review finds it to be unsupported. The association results from a gestalt impression of similarity by early taxonomists. Suggested characters are poorly articulated or widely distributed in the class Aves, and hence invalid as synapomorphies at the level of Passeriformes and Piciformes. These findings reflect the general pervasive influence of traditional views, frequently unfounded, on current ornithological classifications.

The third section of this thesis describes in detail the occurrence of passerine-type syringeal complexity in "higher" birds. Intrinsic musculature is reported in kingfishers, parrots, hummingbirds, colies. Internal

cartilages are reported for hummingbirds, colies, and motmots. Other features are described as well.

In the fourth part, the phylogenetic implications of syringeal morphology are compared to hypotheses derived from independent sources, such as non-syringeal morphology and DNA-DNA hybridization studies. It is suggested that parrots and colies may form a clade, as may swifts and hummingbirds (a traditional but persistently debated association). The relationships of these taxa are otherwise enigmatic.

Considerable discussion focuses on implications of syringeal morphology to the inter- and intra-ordinal relationships of the Passeriformes. Ames (1971), on the basis of the traditionally held relationship with Piciformes, assumed that the ancestral passerine syrinx was simple. Here, the possibility of a passerine relationship to colies, parrots, swifts, and hummingbirds is suggested, and the implications to individual character evolution are examined.

The syrinx appears to have several potential advantages as a higher-level systematic character complex. First, it can be prepared and examined in a relatively short time, enabling a broad comparison that is not feasible for more complex characters. Second, its morphology appears to be conservative, differing little within or between closely related species. Third, it is functionally unrelated to

other traditional morphological characters currently in use. The principle disadvantage of study of syringeal morphology is the unavailability of many species as alcoholic specimens.

A note of caution must be made in studies of single-system studies such as this. Although there may be reasons, cited above, that syringeal morphology can contribute to the resolution of taxonomic questions, it is not implied that this character complex offers better or more reliable information than other well-studied systems. No single morphological character is infallible or applicable at all levels. The primary value of syringeal morphology to avian systematics, particularly nonpasserine systematics, is simply that it is new information, answering the taxonomists perpetual quest for new characters with which to test the old hypothesis. The new characters are not better, or overriding, but simply add to our knowledge.

I. Syringeal Terminology

A. Introduction

The study of syrinx morphology began early in the history of avian taxonomy and made fundamental contributions to bird classification (e.g., Müller 1847. Garrod 1877). The organ continues to provide key phylogenetic information about some taxa (e.g., Lanyon 1986) while the potential contribution remains unexplored in many others.

Despite a long tradition and vigorous current research, the terminology of syringeal elements remains imprecise. Although several studies have described syringes of individual species (e.g., Chamberlain et al. 1968, Ellis 1972), no cross-taxonomic review of syringeal morphology has been attempted since Beddard (1898), although Baumel et al. (1979) provided a brief summary of terms. As noted by Bock (1972), even Ames (1971) did not include a unified review of terminology in his comprehensive monograph on the passerine syrinx, nor did Ames cite any earlier study to serve as a descriptive basis.

Some syringeal terms have meanings that are vague, misleading, or clearly contradictory. This has caused misunderstanding of the taxonomic distribution of syringeal features, and hindered phylogenetic and ecomorphological interpretation. Here, I make recommendations towards a

uniform usage and summarize actual distributions of several syringeal features.

B. Methods

This section primarily reviews the published usages of syringeal terminology, but conclusions are based on and corroborated by an extensive examination of nonpasserine syringeal morphology. Over 600 syringes representing 57 families and 22 orders of nonpasserine birds have been dissected and examined (see Appendix). Preparation procedures largely follow Ames (1971) except that iodine staining (Bock and Shear 1972) was used to enhance the visibility of small muscles, and many specimens have been cleared and stained for cartilage and bone (after Dingerkus and Uhler 1977; see also Part III). Information about passerine syrinx morphology comes primarily from Ames (1971) but examination of particular passerine syringes has been possible through the kindness of W. Lanyon.

C. The Syrinx

The term "syrinx" replaced reference to the "lower larynx" in early anatomical works (e.g., Huxley 1867) and has usually been defined by a combination of function and position, for example: "the voice organ of birds...situated at the bifurcation of the two bronchi" (Beddard 1898:60). Although clear at a general level, the specific intent and

implications of this definition are problematical.

For example, syringes have traditionally been categorized as "tracheal," "bronchial," or "tracheo-bronchial" depending on the location of structural specializations relative to the point of bronchial bifurcation. Two of these traditional types, "tracheal" and "bronchial" syringes, actually specify locations away from the tracheobronchial bifurcation, in direct contrast to the definition above. Many syringeal descriptions go no further than assignment to one of these categories. Here, a typological approach has hindered specific morphological knowledge and fostered misunderstanding. Some of these problems have been noted by Ellis (1973), but other recent anatomical surveys (e.g., Ames 1971, Baumel et al. 1979) have made no attempt to approach a definition of the syrinx and hence offer no improvement. Below, I attempt to describe the avian syrinx in a manner which evades the hazards of typology.

Only birds have a syrinx. The tracheal bifurcation of amphibians, reptiles and mammals consists of unmodified, complete rings, lacking associated membranes or muscles (Maynard 1928, Webster and Webster 1974). Specializations which occur in this region in birds may thus be considered derived within birds.

But within the class, the syrinx is not a single homogeneous or homologous structure. Rather, it consists

of a complex of specializations of muscles, membranes, and cartilaginous or ossified supporting structures which occur in the general region of tracheal bifurcation, and these may vary greatly between avian taxa.

For example, superficially similar "tracheal" type syringes occur within the Ciconiidae and the Furnari. But these syringes differ in detail (pers. obs.) and the taxa possessing them are known to belong to different clades (see Raikow 1982, Sibley and Ahlquist 1986). Thus, these tracheal syringes appear to represent independent, nonhomologous innovations. Again, a comparison of tracheal syringes to the "bronchial" syrinx of Steatornis (in which the internal membranes are located a considerable distance down along the bronchi) emphasizes the diversity of form which comprises the avian syrinx.

Similarly, reference to syringeal "loss" (Miskimen 1957, Ligon 1967, Rea 1983) appears to imply loss of all specializations and reversion to a "pre-syringeal" reptilian state. In fact, taxa for which syringeal loss has been described are actually lacking only one or more syringeal features, while retaining others. Like other syringeal innovations, simplification or loss of particular syringeal elements has occurred independently in different avian lineages. For example, there has been reduction of M. tracheolateralis in some ducks, some Galliformes, Musophagidae, Cathartidae and Ciconiidae.

It follows that the syrinx cannot be considered a single organ; nor can it be considered as structurally separate from the trachea or bronchi, as has sometimes been implied (e.g., Stein 1968, Greenewalt 1968, 1969, and even Ellis 1973 who specifically discussed this point). Rather, the syrinx should be viewed as a diverse set of specializations superimposed on the trachea and bronchi.

Actually, even the differentiation of homologous "tracheal" and "bronchial" regions is by no means straightforward. Reference to the divided respiratory tubes as "bronchi" is a descriptive rather than homologous terminology. The number of ring elements along the tracheobronchial passage is variable within birds, as is the relative position of bifurcation. For example, in New World vultures the bronchi are very short, consisting of 10-15 rings; in hummingbirds, the syrinx is located in the neck region and the bronchi consist of 30 to 40 rings (pers. obs.).

Ames (1971) discussed the problem of homology of particular supporting elements. Instead of the traditional reference to tracheal or bronchial elements, he proposed reference to A- and B-type elements and specified criteria for differentiating these. This approach was a significant improvement and implied a real "tracheal" and "bronchial" homology within passerines. But the method has also

received criticism (Bock 1972). Ames's (1971) criteria for ring differentiation do not apply to syringes of many nonpasserine birds.

Given these points, is it useful to attempt a new definition of the syrinx? From a phylogenetic point of view, it probably isn't; understanding of relationship would be better served by describing the taxonomic distribution of particular syringeal features. From a morphological view, it is useful to have a general term for the "voice organ of birds" if one can be precisely defined. Starting from this general definition of Beddard (1898), what, then, are the limits of the syrinx?

Beddard's (1898) definition utilized functional and positional criteria. The mechanics of phonation are poorly understood (Gaunt and Gaunt 1985b), but the entire trachea, glottis, manubrium, and entire avian skeleton have been suggested as influencing sound production (Schnell et al. 1985, A. Gaunt pers. comm.). Surely these are not all "syringeal."

Here, I propose that the term "syrinx" be used to indicate a complex of elements of the lower respiratory tract which affect or utilize air flow for the production of sound. This includes, for example, fused tracheal rings, connective tissue sheaths, extrinsic and intrinsic muscles (see below), and internal syringeal elements. This is a liberal definition, excluding only structures that are

entirely independent of the region of tracheal bifurcation, such as tracheal convolutions, the tracheal pouch reported for Casuariidae (Murie 1867), or the tracheal expansion of the duck Netta peposaca (Garrod 1875).

D. Internal Syringeal Elements

In 1847, Müller depicted paired syringeal elements apparently free-floating within the internal tympaniform membranes of hummingbirds (Müller 1847, Plate V, fig. 3). He called these "cartilago arytaenoidea." In 1963, Miskimen reported "small cartilages free of any muscle attachment...in the internal tympaniform membranes" of several tyrannid flycatchers. She applied the name "internal broncho-syringeal cartilages" to these. In his comprehensive study of passerine syringes, Ames (1971) shortened this tc "internal cartilage."

Actually, neither Miskimen (1963) nor Ames (1971) applied stain to syringes and so could not know whether these elements were cartilaginous or ossified. Miskimen's use of the descriptor "cartilage" was based on her idea that the entire syrinx was cartilaginous. In fact, most avian tracheae and syringes are ossified (Lanyon 1985, 1986; pers. obs.) so that Miskimen's basis for reference to cartilage was erroneous. It was not until Lanyon's (e.g., 1985, 1986) application of staining techniques to suboscine syringes that the cartilaginous nature of tyrannid internal

elements was confirmed.

Still, I prefer to refer to "internal syringeal elements" rather than specifying the nature of the supporting matrix. The degree of calcification of several syringeal elements, such as the pessulus or the first few A-rings, is variable. This does not preclude their homology, nor would the discovery of partial or full calcification of an internal element in an individual, species, genus, or higher taxon preclude its homology with cartilaginous structures in others. In fact, the internal elements of hummingbirds are partially ossified (see Part III).

Ames (1971) and Lanyon (e.g., 1985, 1986) have surveyed the taxonomic distribution of internal elements in suboscine birds, but neither specified a definition for the structures. Within his general description of the syrinx of the Tyrannoidea (p. 33), Ames did note that internal elements are "variable in shape and number and may float freely in the membranes or be attached to other elements." McKitrick (1985) did provide a definition: "cartilaginous plates of various shapes located within the the internal tympaniform membranes of the syrinx." As I argue above, the significance of a cartilaginous state is not apparent and I believe it should be excluded from a definition.

Because their distribution has been most thoroughly reviewed within the Tyrannidae (Ames 1971, Lanyon 1985,

1986) the term "internal cartilage" (here, internal element) has to some extent become associated with that family, perhaps obscuring understanding of the actual taxonomic distribution of this feature in birds. Lanyon (1984:3) stated that within suboscines, internal elements were unique to the Tyrannidae, despite their reported presence in some Acanthisittidae and Philepittidae (Ames 1971). McKitrick (1985) also reviewed the distribution of internal cartilages. She did note reports of their presence within the Acanthisittidae and Philepittidae, but not in taxa outside of the Passeriformes. Internal elements have been reported in some taxa, e.g., Trochilidae (Müller 1847), which have been considered to be close passerine relatives, and hence might serve as outgroups to a study of the Tyranni (see Part IV).

In fact, a variety of taxa, including some non-passerines, possess structures which fit published descriptions of internal elements and these are listed in Table 1. Here, the term internal element is used in a descriptive sense; Table 1 indicates taxa with a particular type of structural similarity. The homology of these structures is not established although some possibilities of homology are discussed in Part IV.

Although internal elements have been reported for oscines (see Baumel et al. 1979), Ames (1971) did not find them to be present in any syringes of 534 oscine species

Table 1. Taxonomic distribution of internal syringeal elements.

Taxon	References
Trochilidae	Müller 1847 (Plate V, fig. 3); Baumel et al. 1979; Cannell (Part III)
Coliidae	Cannell (Part III)
Ramphastidae (?)[1]	Beddard 1898, Cannell (Part III)
Momotidae	Garrod 1878, Cannell (Part III)
Acanthisittidae (in part)	Ames 1971
Philepittidae (in part)	Ames 1971
Tyrannidae	Miskimen 1963, Ames 1971, Lanyon 1985, 1986, McKitrick 1985
Cotingidae (in part)	Ames 1971, McKitrick 1985
Pipridae (in part)	Ames 1971, McKitrick 1985

[1]See text.

that he examined. Oscines are excluded from Table 1.

E. Syringeal Myology

The muscles that affect respiratory sound production in the region of bronchial bifurcation are unambiguously of two sorts: "long" muscles with at least one attachment away from "the syrinx;" and "short" muscles whose origination and insertion are both on or near "the syrinx" (for a definition of the syrinx itself, see discussion above). Despite long study (including an important recent contribution by Ames 1971), the morphology of avian syringeal muscles remains poorly known, hindering use in current phylogenetic studies. The cause, at least in part, is an inconsistent and typological terminology. Here, I discuss the nature of these problems, and make recommendations towards a more uniform and accurate usage.

Syringeal Muscles

The long muscles of the syrinx are M. tracheolateralis and M. sternotrachealis. These are present in virtually all birds and are relatively uniform in configuration. Because of their ubiquity, they have been discussed in the taxonomic literature primarily in the context of reduction or loss (e.g., Ligon 1967).

The short muscles of the syrinx are of more restricted taxonomic distribution and of a more complicated, variable

nature. They are best known within Passeriformes (see Chamberlain et al. 1968, Ames 1971). An extensive terminology describing number and insertion position of passerine short syringeal muscles was developed early in the history of avian taxonomy (e.g., acromyodian, mesomyodian, etc.), and used to formulate classifications within that order (see Müller 1847, Garrod 1877). Although syrinx morphology remains important in passerine taxonomy (see Ames 1971, Lanyon 1984, 1985, 1986), these early terms have now been abandoned due to their general, typological nature. Some terms describing the number of short muscle pairs were in use until very recently (e.g., Oligomyodi in Sibley and Ahlquist 1985), but even these have subsequently been abandoned (Sibley, Ahlquist, Monroe, in press).

There is some confusion as to whether some or all of these muscles form part of the syrinx (see Table 2). In technical description, syringeal muscles have been categorized on the basis of their origination and insertion positions. For example, M. sternotrachealis neither inserts nor originates on the syrinx (in the strict sense) and has been considered <u>not</u> to be a syringeal muscle although its primary effect is unquestionably on that organ (Gaunt and Gaunt 1985b). Categorization of M. tracheolateralis has varied, while "short" muscles have invariably been considered "syringeal" (although describing their insertion <u>on</u> the syrinx implies they are not

themselves part of the syrinx).

George & Berger (1966:264) did not consider M. sternotrechealis to be "syringeal," nor, apparently, did Baumel et al. (1979:241 ff.), although that discussion is not entirely clear. In these works, M. sternotrachealis and M. tracheolateralis are categorized as "tracheal" as opposed to "syringeal" muscles. Baumel et al. (1979) describe "syringeal muscles" as being "very small," implying a restriction of the term to the short muscles, on which subsequent discussion does focus. Nevertheless, mention of M. tracheolateralis is also made.

The question of which muscles comprise "the syrinx" is not of great interest, except in the interpretation of statements by other anatomists. For example, when Van Tyne and Berger (1976:572) said that "functional syringeal muscles are absent in some ratite birds, in storks, and in American Vultures," which muscle losses did they intend to indicate? Do these taxa lack M. sternotrachealis, or only M. tracheolateralis, or just "short" syringeal muscles? Despite further discussion of "syringeal loss" in these taxa (Miskimen 1957, Ligon 1967, Rea 1983, Terres 1980), it is not possible to know their precise syringeal myology without personal examination of specimens; the ostrich, storks and cathartid vultures do lack M. tracheolateralis and all "short" muscles but retain M. sternotrachealis (pers. obs.). The imprecision of published discussion on

this topic is apparent.

Intrinsic vs. Extrinsic: Traditional Usage

A more important terminological confusion stems from the traditional division of syringeal muscles (here including M. sternotrachealis and M. tracheolateralis as well as "short" muscles) into intrinsic and extrinsic syringeal muscle categories (see Table 3). In usage, those muscles with at least one attachment to the syrinx have been called intrinsic syringeal muscles, including M. tracheolateralis and all the short muscles (see Table 3). Thus, M. sternotrachealis is the single extrinsic syringeal muscle (despite its exclusion as a syringeal muscle by technical diagnosis, above). This was the usage of Shufeldt (1890), Beddard (1898), Garrod (1877) and authors who use these works as primary sources (e.g., Ligon 1967, Rea 1983).

Intrinsic vs. Extrinsic: Current Usage

In his influential monograph on passerine syringes, Ames (1971) used a different definition, and a still different usage. He defined extrinsic muscles (1971:16) as ones that "originate away from the syrinx and insert on it" but he then designated both M. tracheolateralis and M. sternotrachealis as examples of extrinsic muscles. M. sternotrachealis, of course, does not insert on the

Although recent years have seen an exit of the MSW worker from the field of child welfare, social work has traditionally been the primary discipline represented in these settings. The growing professionalization of social work in the early years of its development also influenced the direction that services would take for black children.

An ecological perspective that broadens the assessment of individuals and families to include their interactions with the larger systems in the environment is a fairly recent development in the profession. This perspective did not become clearly articulated as a theoretical base for social work practice before the early seventies (Germaine, 1973). Early in the development of clinical social work practice Freudian Psychoanalytic theory, which gave little attention to the effects of environmental influences on individual and family functioning, formed the underlying theoretical orientation that shaped practice. This orientation meant that black families were assessed and understood primarily from the view of the dominant culture and recognition was not given to the effects of transactions with external systems. In child welfare settings the influences of this view had its greatest impact in the area of adoption and the development of in-home support services for families. In the absence of sufficient theory related to black family functioning, well intentioned practitioners further perpetuated a practice of removal of children from their own homes. The professional worker's conceptualization of the ideal family, and the child that was suitable for adoption resulted in the unnecessary removal of children from their own homes and made permanent foster care the reality for an increasing number of black children.

syrinx. Ames was thereafter consistent in referring to both M. sternotrachealis and M. tracheolateralis as extrinsic muscles. Ames did not define intrinsic musculature, but was consistent in restricting usage of this term to the "short" syringeal muscles.

Ames's (1971) terminological separation of the short muscles from both long muscles is clearly different from traditional usage (see Table 3). He did not discuss the reasons for this deviation. Baumel et al. (1979) attributed Ames's terminology to Owen (1866), but Owen did not employ the terms intrinsic or extrinsic in reference to syringeal myology.

In a series of papers on syringeal biomechanics, Gaunt (1983) and Gaunt and Gaunt (e.g., 1985b) also differ between their own definition and usage. They provide a functional definition (1985:214), considering extrinsic muscles to be those that "affect syringeal configuration by changing the position of the trachea," whereas intrinsic muscles "affect the configuration of the syrinx directly, but even this distinction is not always clear." In most syringes, M. tracheolateralis inserts on the first bronchial or tracheal ring, or directly onto the external tympaniform membrane. This would qualify as an intrinsic muscle according to the definition above, and align with traditional (pre-Ames) usage. In fact, Gaunt and Gaunt consistently refer to both M. tracheolateralis and M.

sternotrachealis as extrinsic and to short muscles as intrinsic, following exactly the example of Ames (1971).

Intrinsic vs. Extrinsic: Discussion

In the nineteenth century, a complex terminology of syringeal myology was developed (as described above). This terminology was specifically restricted to use with passerine birds (Garrod 1877:507) and implied, falsely, that myological complexity does not exist in the syringes of non-passerine birds. In fact, Beddard (1898) and earlier workers did describe intrinsic "short" muscles for several non-passerine families. But because of the changed usage of the term "intrinsic," these nonpasserine "short" muscles have been overlooked by several recent anatomists. Beddard used the term "intrinsic" to refer to M. tracheolateralis, but he also did use the term to describe real "short" intrinsic muscles. However, several references to real intrinsic muscles were dismissed or overlooked in recent literature as referring only to M. tracheolateralis. Neither Beddard (1898), nor George and Berger (1966) nor Baumel et al. (1979) accurately review the distribution of intrinsic musculature in birds. For example, Ames (1971:133) himself stated that intrinsic muscles were lacking in Coraciiformes despite documentation by Beddard (1898) of intrinsic "short" muscles in kingfishers (Alcedinidae).

Table 2. Usage of the term "syringeal muscle."

	George & Berger (1969)	Ames 1971
	Baumel et al. 1979	Cannell 1986
M. sternotrachealis	-	+
M. tracheolateralis	+/-	+
"short" muscles	+	+

Table 3. Usage of the term "intrinsic muscle."

		Ames 1971
	Beddard 1895	Gaunt & Gaunt 1985b
	Garrod 1877	Cannell 1986
M. sternotrachealis	-	-
M. tracheolateralis	+	-
"short" muscles	+	+

The situation is worsened by apparent inconsistent usage by early primary workers. For example, in Beddard's (1898:228) description of hummingbird syringes he stated that "there seem to be two pairs of extrinsic muscles, which form a very prominent muscular mass, as in Passeres" (italics added). He then specifically notes the absence of M. sternotrachealis, the only muscle that he would normally call "extrinsic." Beddard has apparently used "extrinsic" when he means "intrinsic;" hummingbirds in fact lack M. sternotrachealis but do have M. tracheolateralis and at least one pair of short intrinsic muscles. The syrinx of hummingbirds has not been described elsewhere; the result of this apparent carelessness has been to obscure the presence of intrinsic muscles, a typically passerine character (as Beddard does note) in a group whose familial affinities are still uncertain (see Zusi and Bentz 1982). There are other examples within Beddard's work of apparent confusion of terms.

Intrinsic vs. Extrinsic: Recommendations

Because of inconsistent and imprecise usage, categorization of syringeal muscles as "extrinsic" or "intrinsic" has only generated confusion. Here, I recommend that reference to "extrinsic" syringeal muscles cease. There are only two, relatively unvarying muscle pairs: M. sternotrachealis and M. tracheolateralis. There

should be no practical difficulty in referring specifically to one or both of these muscles, ensuring accuracy of interpretation.

A specific, non-typological nomenclature of the "short" muscles would also be desirable, but our state of knowledge of the configurations and homologies of these muscles does not allow that at this time. Terminology and homology problems with the complicated syringeal musculature of passerines, and oscines in particular, have been noted by Ames (1971), Bock (1972), and Baumel et al. (1979). Terminological confusion exists even for the simpler musculature of suboscines; Ames (1971) named muscles for some species, but did not do so for others. Until a more detailed comparative myological review has been made of passerine and nonpasserine syringes, it does not appear possible to apply a specific nomenclature.

Still, keeping in mind the importance of specific description, a means of referring to short syringeal musculature is needed. For example, Gaunt (1983) has suggested that vocal complexity (possession of repertoires, etc.) is possible only in taxa with "intrinsic" syringeal muscles. Raikow (1986) has discussed possible implications of vocal complexity on taxonomic diversity. It is sometimes desirable to be able to refer to a morphological type regardless of homology.

I recommend that short syringeal muscles be referred to

Table 4. Taxonomic distribution of intrinsic syringeal muscles.

Taxon	References
Coliidae	Müller 1847 (Plate V, figs. 9-12); Cannell (Part III)
Trochilidae	Müller 1847 (Plate V, figs. 1-3); Beddard 1898; Baumel et al. 1979; Cannell (Part III)
Psittaciformes	Baumel et al. 1979; Gaunt and Gaunt 1985a; Cannell (Part III)
Alcedinidae	Müller 1847 (Plate III, figs. 9-10); Beddard 1898; Cannell (Part III)
Passeriformes	Müller 1847; Setterwall 1901; Ames 1971; McKitrick 1985

as "intrinsic" syringeal muscles. This contrasts with early usage, so that misinterpretation of early works remains a possibility. However, this application is in accord with current usage (e.g., Ames 1971, Lanyon) of the term (see Table, 4 and discussion in Part III). The taxonomic distribution of intrinsic syringeal muscles is summarized in Table 4.

F. Conclusions

The accuracy and precision of a terminological system is important because of its success or failure in describing the taxonomic distribution of specific morphological features. These features may or may not be homologous. If homology is unknown, as is frequent in ornithological anatomy, then the proper approach to a terminology is unclear. On the one hand, application of one term may imply homology where none may exist. On the other, different names may imply lack of homology between structures that are actually homologous. There is no "neutral" method of naming structures. Here, I have recommended that certain terms be used in a descriptive, rather than homologous sense. Knowledge of syringeal structure remains poor. Basic description, including careful delimitation of taxonomic distributions, must precede the assessment of levels of homology, although the two processes are not unrelated.

Another emphasis here has been the typological tendency that permeated early ornithological anatomy. The structure of the palate, intestinal coiling, thigh muscles, feather tracts and many other features have all been assigned to categories and systematic formulae. This has obscured knowledge of variation within these structures, and hence slowed understanding of the morphology and phylogeny of birds. The syrinx has not escaped typological discussion, primarily in regard to categorization as tracheal, bronchial, and tracheobronchial types, in regard to possession of intrinsic musculature, and in reference to the presence or loss of the "syrinx" as a single entity. The development of a more precise and consistent terminology parallels increased knowledge of the morphology of the syrinx, but we are only now approaching a point where knowledge of syringeal morphology is specific enough to be of broad use in avian systematics.

II. A Reassessment of the Pico-Passerine Relationship

A. Introduction

The clustering of tha avian orders Passeriformes and Piciformes represents one of the most accepted traditions of ornithological systematics. Almost 60% of living bird species belong to the Passeriformes (Bock and Farrand 1980) so that the order's origins are not without interest. In fact, precise support for a relationship between Passeriformes and Piciformes is difficult to find, despite its consistent adoption in classifications (see below). As Raikow (1982:443) has noted, there is "a common tendency for biologists to assume that traditional taxa are monophyletic, perhaps because that which is familiar tends to appear 'natural' in some sense." For exactly this reason, Raikow urged the reevaluation of associations supported primarily by tradition.

Prompted by recent morphological (see Part IV) and biochemical (Sibley and Ahlquist 1986) suggestions that other orders may be more closely related to passerines than the Piciformes, I here reexamine the foundations of the traditional piciform/passeriform association. I first review the derivation of the pico-passeriform tradition, and then reexamine individual traditional characters. Countless studies of the Passeriformes use members of the

Piciformes as comparative taxa (outgroups), and vice versa. If these orders are not most closely related, then conclusions drawn from these comparative studies may be in need of reevaluation.

This analysis is made easier by the recent corroboration of passerine monophyly by Raikow (1982) who found some support in 5 of 18 traditional passerine characters. The monophyly of the Piciformes has also been recently corroborated on the basis of three morphological characters (Simpson and Cracraft 1981, Swierczewski and Raikow 1981, Raikow and Cracraft 1983).

B. Methods

Much of the currently accepted classification of birds was developed during the nineteenth century, by Furbringer (1888), Garrod (1873), Gadow (1892) and other early anatomists. In the twentieth century, avian systematics has focused primarily on questions related to geographic variation and species and subspecies limits. Phylogenetic problems, particularly at higher taxonomic levels, received relatively less attention from morphologists. Traditional classifications may be sound but are based on a gestalt methodology that is no longer regarded as rigorous in regard to phylogenetic determination. Relationships implied by traditional classifications are in need of reevaluation.

Over the last few decades, a more rigorous approach has been introduced to phylogenetic inference by cladistic methodology (Hennig 1966, Eldredge and Cracraft 1980, Wiley 1981). Within ornithology, this has sparked renewed interest in anatomy and higher-level relationships. A second impetus to morphological systematists came from the contributions, frequently controversial, of biochemical taxonomists. Consequently, several higher avian taxa have recently been reanalyzed (e.g., Cracraft 1982, 1985, Maurer and Raikow 1981, Raikow 1982).

The methodology of accepting or discarding traditional characters has been discussed most carefully for birds by Raikow (1982). That methodology, which follows from ideas associated with cladistics in general, is used here. Essentially, a character is required to be validly described, and independently derived within the taxon under examination. Here, those characters that have been indicated as supporting a pico-passeriform association are re-examined in order to determine: a) their validity; b) evidence of polarity; c) their taxonomic restriction to these two orders. If one or more characters are found that satisfy these requirements, the traditional relationship will have been corroborated, with confidence increasing with the number of corroborating characters. Two other alternatives may result. Characters may be found that support some conflicting relationship, in which case a

piciform/passeriform relationship would be rejected. Finally, it may result that no valid characters are found. In that case the hypothesized relationship is neither rejected nor supported, but support for the traditional relationship has been rejected. A close relationship of Piciformes and Passeriformes would remain an untested hypothesis until such time that other evidence provided support or conflict.

C. Historical Development

Like much current avian taxononomy the association of Piciformes and Passeriformes appears to stem from Furbringer (1888) who proposed a "Pico-Passeriformes" suborder. This was composed of two "Gens:" one was the Passeriformes as currently composed; the other was the Pici, as currently composed but excluding the Bucconidae and Galbulidae. The name "pico-passerines" was used by subsequent authors, but, as with other names for higher taxonomic categories, frequently indicated a distinctly different cluster of taxa (see Seebohm 1890, Sharpe 1891).

Another early association of woodpeckers and passerines was that of Huxley (1867) who placed woodpeckers alone in a group called "Celeomorphae." He described them as intermediate between the "Coracomorphae" (Passeriformes) and the Coccygomorphae (Trogoniformes, Coliiformes, Coraciiformes, other Piciformes). He suggested (p. 468)

that the Celeomorphae (Picidae) might best be associated with the "Coracomorphae" (Passeriformes) as an aberrant group of aegithognathes, thus hinting at a Picidae/Passeriformes relationship that was not reflected in his classification. Huxley said: "the woodpeckers, in fact, are not desmognathous, the palate in these birds exhibiting rather a degradation and simplification of the aegithognathous structure. The vomers retain throughout life the condition which is transitory in the Coracomorphae." He then mentions several other characters that he believed were shared by these two groups, but not in detail, and not their distribution in other taxa.

In 1877, Garrod addressed the question of passerine taxonomy. Ames (1971) cited this paper by Garrod as justification for his own assumption of a Passerine/Piciform relationship. Ames noted Garrod's reference to "similarities in the colic caecae, carotid arteries, leg muscle formulae and certain tendons of the wing."

Garrod (1877:508, 514) did allude to such characters in reference to "Passeres." The term "Passeres" has been used in various ways (see Sharpe 1891), but Garrod clearly intended it to mean the current Passeriformes, excluding Piciformes, Coraciiformes, or other nonpasserine taxa. For example, in the same list of characters he refers to "palate aegithognathous," a primarily passeriform character

(Raikow 1982). Garrod (1877:507) also specified "Passeres" and "Picariae" as separate taxa, and repeatedly compares "Passeres" to "other birds" citing piciform and coraciiform families as examples of "other birds." Finally, on page 518 he specifies his conception of Passerine relationships, excluding nonpasserines. Hence, Ames (1971) was mistaken in his specific justification for a Piciform relationship of Passeriformes.

Garrod (1877:508) did "define" a Passeriform and Piciformes group, on the basis of "oil-gland is nude and colic caeca are always present." He noted that these groups also lack the ambiens muscle of the avian thigh. However, the Passeriformes he refers to is the "Cuvierian Passeres" that includes current Passeriformes plus "those non-swimming, non-wading, non-climbing, non-raptorial, non-gallinaceous birds in which there are not two toes of the foot retroverted." Hence, Garrod is indicating a broad grouping of "higher" bird orders, and has made no statement about the taxa we currently call Piciformes and Passeriformes. The rest of Garrod's 1877 paper refers to characterization of the Passeriformes as an order, and of its component taxa; similarly for the other papers in that series (Garrod 1877-1878). Indeed, Garrod (1877:448) himself referred to the "ordinal importance of the Passerine group as one of vital ornithological interest."

In 1892, Gadow presented a classification of birds in

which the "Pici" (current Piciformes) and "Passeres" (current Passeriformes) were placed together in a taxon Passeriformes. Gadow presented a series of characters that together constituted a diagnosis. A diagnosis is a series of characters which, taken together, allow identification of a group. They do not, by current methodology, necessarily reflect relationship. Gadow's characters are discussed individually below.

The question of Passeriform/Piciform relationship was also addressed directly by Seebohm (1890) who also provided a diagnosis, saying "each of these six characters appears in every pico-passerine bird; each of them is also found in some bird which is not one of the Pico-Passeres; but the combination of the six characters is never found in any bird which is outside the limits of the Pico-Passeres." In fact, some of Seebohm's characters exclude only one or a few orders. These "diagnostic" characters are described below. One of his individual characters is a combination of muscle states that I analyze as separate characters.

In 1946, Lowe addressed the question of a piciform - passeriform relationship. He described ten differences between Piciformes and Passeriformes, and nine characters in which "the Pici in their morphology agree with the Passeres" (1946:111). I describe the characters of this latter category below. Lowe concluded that "the term Pico-Passeriform" seemed justified.

In 1977, Feduccia, on the basis of morphology of the stapes, proposed that the Passeriformes were polyphyletic and that the suboscines might have shared a common ancestor with some families of the Coraciiformes. This view was later retracted (Feduccia 1979) in a paper that supported passerine monophyly. Feduccia had previously noted (1977:22) that "the stapes is therefore of little use in determining the relationships of the Piciformes to other perching birds."

Mayr and Amadon (1951), Stresemann (1959), Voous (1977), and Cracraft (1981) all adopted the association of Piciformes and Passeriformes without discussion, although Cracraft (1981) did note that "a precise hypothesis of their interrelationships has not been supported." Sibley (1970) and Sibley and Ahlquist (1972) reviewed the taxonomic history of virtually every other higher bird relationship, but never discussed in detail the traditional association of passerines and piciforms, nor, apparently, tested the relationship of passerines to nonpasserine groups with protein electrophoresis.

Because of its consistent (but untested) occurrence in classifications, the association has been generally assumed, and numerous studies have used one or the other order as a basis of comparison. Maurer and Raikow (1981) in a review of Coraciiform relationships used Piciformes and Passeriformes as their outgroups. Ames (1971), in his

comprehensive review of passerine syringeal morphology, followed tradition and accepted the Piciformes and the "closely related" Coraciiformes as an "outgroup" and based his ideas on the evolution of the passerine syrinx on that comparison (see Parts IV and V). Feduccia (1979) based his ideas of passerine monophyly on comparison of passerine sperm morphology to only a few woodpecker species among nonpasserines (although McFarlane (1963) examined sperm from a broader array of nonpasserine taxa, it is not obvious that the characters he discussed are the same as those discussed by Feduccia (1979)). This weakly-tested comparison formed one of the 5 characters that Raikow (1982) indicated as supporting passerine monophyly. Numerous other studies also base their conclusions on comparison to Piciformes. If Piciformes are not closely related to Passeriformes, then these and other conclusions may be in need of reevaluation.

D. Character Analysis

A review of individual characters proposed as evidence for a relationship between Passeriformes and Piciformes follows:

1. "Colic caecae...present" (Garrod 1877) - Garrod applied this character to the Piciformes and Passeriformes, but used the taxonomic term Passeriformes in the broad

Cuvierian sense (see above). Hence, colic caecae are reported by Garrod and others to be present in a broad array of bird orders in addition to the Passeriformes and Piciformes (current usages). Baumel et al. (1979) state that "in most groups of birds right and left caeca open into the cranial part of the rectum." Beddard (1898:30) has called this the "most variable organ of birds" and Raikow (1982) said it may vary considerably in closely related birds with different feeding habits. Its presence in Piciformes and Passeriformes certainly does not support monophyly of a clade including just those orders.

2. "Oil gland nude" (Garrod 1877) - Those birds that lack a circlet of feathers around the uropygial gland are considered to have "nude" oil glands. It is discussed by Seebohm (1890), Newton (1893-1896), Beddard (1898), Raikow (1982) and others and has been shown to be of wide distribution in birds. Again, Garrod applied this condition to the broad Cuvierian sense of Passeriformes. It cannot be used to confirm a relationship between Piciformes and Passeriformes.

3. Palate aegithognathous (Huxley 1867) - An aegithognathous palate is one in which the prevomers are large and completely fused and truncated in front, separating

the maxillopalatines (see Van Tyne and Berger 1976). Huxley said that the palate of the Picidae (but not other Piciformes) was a simplified aegithognathous structure: "the vomers retain through life the condition which is transitory in the" Passeriformes. Lowe (1946) also discussed this, indicating agreement with Huxley, but did not include palate structure as one of his piciform/passeriform characters. The Capitonidae (Beddard 1898:321) and Indicatoridae (Beddard 1898:197) have also been suggested as having aegithognathous tendencies. Swifts (Apodidae) also have an aegithognathous palate. Raikow (1982) discussed the aegithognathous palate, concluding that it was probably independently derived within the Passeriformes. It is possible that elements of the piciform palate are synapomorphous with that of Passeriformes, but a precisely formulated hypothesis does not exist at this time.

Discussion of the avian palate has been largely typological: assignment to a palate type usually ends further analysis of palate anatomy. Advancement in our knowledge of palate anatomy will come when individual palate components are examined and compared.

4. Morphology of the wing coverts (Huxley 1867, Lowe 1946) - Huxley described "short wing coverts" as a

piciform/passeriform character. Lowe described no major wing coverts for the secondaries and "morphology of the median and lesser" coverts as being "an important and constant characteristic of the Passerines by which they might be defined from all other birds, except the Pici." Because of this specification, this is potentially an important character. However neither Huxley nor Lowe described what they meant by these phrases. Nor have subsequent students of plumage or pterylography noted this point (K. Parkes, G. Tudor pers. comms.). Superficial examination of higher bird orders does not reveal a distinct piciform/passeriform covert morphology. At this time, the character remains undefined and hence does not support a relationship.

5. "Conical scapulae accessoriae" (Huxley 1867) - This character was mentioned by Huxley (1867:468) but not described. Neither it nor a possibly similar element are mentioned by Shufeldt 1909, Baumel et al. (1979), or other anatomical references consulted, nor does superficial comparison of scapulae of higher birds suggest a distinctive morphology for passeriformes and piciformes. The validity of this character cannot be assessed at this time.

6. "Bifurcate manubrium" (Huxley 1867) - The manubrium, or spina externa, is a rod extending cephally from the cephoventral surface of the sternum. It may be simple or forked. Huxley (1867) noted that the manubrium is forked in Passeriformes and in Picidae. In fact, this condition is widespread in birds and is variable within many orders including Passeriformes (Olson 1971). The opposite condition, with an unforked manubrium (a spina communis) is more restricted. Alternatively, spina interna or spina externa may be absent (Baumel et al. 1979), suggesting that a "forked manubrium" might more accurately be considered as more than one character. In any case, it does not provide support for a piciform/passeriform relationship.

7. "Multiperforate backward process of the tarsometatarsus" Huxley (1867:468) - Huxley does not describe in any further detail what he meant by this phrase. It may be that he indicated the presence of a complex hypotarsus (see character #21, below), or some aspect of the pneumaticity of the tarsometatarsus. The validity of this character cannot be assessed without additional information.

8. Short basal phalanges relative to penultimate (Huxley 1867:468) - I find no further discussion of this size

comparison, and hence cannot evaluate this character. Still, the failure of subsequent authors to employ it in support of a piciform/passeriform relationship is suggestive of its weakness or invalidity in supporting a close relationship between these orders.

9. "Cosmopolitan distribution" (Gadow 1892) - Gadow used this character in his diagnosis. Although biogeographical evidence may arguably be brought to bear upon phylogenetic inference in some cases, shared broad distributions of high-level taxa such as these make no contribution towards phylogenetic inference at all. Moreover, numerous other orders are cosmopolitan or nearly so.

10. Nidicolous - A species that is nidicolous has young that are helpless at birth and unable to leave the nest for a week or more. Gadow (1892) and Lowe (1946) both used this character that is true for many groups, including: Passeriformes, Piciformes, Trochilidae, Psittacidae, Trogonidae, Coraciiformes, Columbidae, and others (Skutch 1976).

11. "Neck with lateral apteria" - Gadow (1892) used this character. Actually, presence of lateral apteria to the spinal tract is the most common state in birds,

found throughout the class (Seebohm 1890). It cannot be used in support of a piciform/passeriform relationship.

12. "Quinto-cubital" - Many birds possess a gap after the fourth secondary, but retain a covert in that position, suggesting loss of the fifth secondary. Birds that are quinto-cubital, or eutaxic, possess the fifth secondary. Gadow (1892) and Lowe (1946) noted the presence of the fifth secondary in Piciformes and Passeriformes, but it is also present in parrots, colies, hummingbirds, goatsuckers, and other orders. Raikow (1982) has discussed the variability of this character within orders and families. Its presence does not support a relationship between Piciformes and Passeriformes.

13. No basipterygoid process - Gadow (1892) used this character. Lack of the basipterygoid process is the widespread condition in birds (Seebohm 1890) so its absence does not support a relationship between Piciformes and Passeriformes.

14. Holorhinal - Garrod (1873) used characteristics of the nostril to define several avian subclasses. These were never accepted but the character continued to be used at other levels. Gadow (1892) used the holorhinal

condition to assist in diagnosis of the Pico-Passerines, despite its widespread occurrence in birds.

15. "14 or 15 cervical vertebrae" - This character used by Gadow (1892) is widespread in birds (Seebohm 1890). Olson (1971) also discussed cervical vertebrae, suggesting that the character may be confounded by addition or loss of sternal ribs which serve as markers of "cervical' vertebrae. The number of vertebrae does not support a sister-group relationship between Piciformes and Passeriformes.

16. "Spina externa long" - Gadow (1892) used this character referring to a long ventral manubrium on the sternum. I find no further reference to a significant difference in the length of spina externa in Passeriformes and Piciformes, nor does superficial examination uphold this character.

17. "Spina interna absent" Gadow (1892) - This is the widespread condition in birds (Seebohm 1890). Its absence cannot corroborate a relationship between Piciformes and Passeriformes.

18. "Sternum with small notches or foramina" Gadow (1892) - This character is not precisely formulated. Avian sterna do contain a varying number of large, well-formed "notches" and these have been discussed by numerous authors (see Heimerdinger and Ames 1967). But the description used by Gadow (1892), "small notches or foramina" suggests another type of character whose validity cannot be properly assessed without further description.

19. Second and third toes always turned forward (Gadow (1892) - This condition is virtually ubiquitous in birds.

20. Flexors of type I, VI, or VII (Gadow 1892) - This actually refers to a broad array of flexor configurations of unknown or dubious homology. Without further detail, this generality cannot support a Piciform/Passeriform relationship.

21. Hypotarsus complex (Gadow 1892) - The avian hypotarsus, or calcaneum, is complex in most birds (Baumel et al. 1979). Its existence in Piciformes and Passeriformes does not support a close relationship of these two orders.

22. Intestinal convolutions of type VII or VIII (Gadow 1892) - This description refers not to a single character but to several possible intestinal configurations (see Gadow 1889, Van Tyne and Berger 1976) rather than a specific condition. The use of intestinal configuration in systematics has received much criticism because of correlations with gut type and feeding behavior, even at an individual level.

23. "Caeca not functional" (Gadow 1892) - Intestinal caecae are said to be vestigial in many birds representing a number of "higher" bird orders. See comments on variability of this organ under character 1.

24. Ambiens lacking - Absence of this superficial thigh muscle was used by Seebohm (1890) and Lowe (1946) to diagnose Passeriformes and Piciformes. It is also absent in many other orders (George and Berger 1966:421). Its loss cannot confirm a relationship between Piciformes and Passeriformes.

25. Accessory femorocaudal muscle never present (Seebohm 1890) - George and Berger (1966:407) reported this absent in a wide variety of higher bird orders. Its absence does not support a close relationship between Piciformes and Passeriformes.

26. Femorocaudal present (Seebohm 1890) - George and Berger (1966:406) reported this present in "most birds."

27. Semitendinosus present (Seebohm 1890) - George and Berger (1966:403) report this present in a wide variety of birds, including many "higher" bird orders.

28. Spinal feather tract never interrupted by a naked tract on hind neck - Seebohm (1890) noted that this excludes only the Herodiones, and so this character does not qualify as a synapomorphy of the Piciformes and Passeriformes.

29. Hallux is always in direct connection with the hind plantar tendon - Seebohm (1890) noted that this character excludes the "synpelmous Picariae, or Syndactyli." Not being syndactylous is certainly a primitive character for birds so this does not qualify as synapormophic for Piciformes and Passeriformes.

30. Dorsal vertebrae are all heterocoelous (Seebohm 1890) - This was reported by Seebohm (1890) himself as the widespread condition in birds.

31. No supraorbital fossae for the reception of nasal glands - Seebohm (1890), who used this character, noted

that it excluded only the "Tubinares." It certainly does not qualify as a synapomorphy of the Piciformes and Coraciiformes.

32. No vinculum - In most birds (Sundevall (1899) there is a cross-connection, the vinculum, between the deep plantar tendons M. flexor hallucis longus and M. flexor digitorum longus. He noted the absence of a vinculum in Passeriformes. Lowe (1946) also noted the absence of a vinculum in both Passeriformess and Piciformes "although there is said to be one." Indeed, in an accompanying illustration of deep flexor muscles of a woodpecker, Lowe included a vinculum! Swierczewski and Raikow (1981) have confirmed the presence of a vinculum in the Piciformes, while Garrod (1877) and Olson (1971) reported it in the Eurylaimidae. Raikow (pers. comm.) has found a vinculum in the Philepittidae. The distribution of this character does not support a close relationship between Passeriformes and Piciformes.

33. Pars propatagialis cucularis joins the tensor patagii longus - Lowe (1946) refers to this as a "very distinctive character of the Passerines." But George and Berger (p. 316) describe this condition for parrots, hoopoos, and other avian taxa.

34. No biceps slip (Lowe 1946) - The biceps slip, a fleshy fasciculus given off from M. biceps brachii in the wing, is also lacking in Trochilidae, Psittaciformes, Strigidae, and other groups. It's absence cannot confirm a relationship between Piciformes and Passeriformes.

35. No expansor secundarium - Lowe (1946) used this character. Berger (1956) and Raikow (1982) both report its presence in a variety of passerine families. Raikow (1982) felt that early anatomists simply overlooked it. Its alleged absence cannot confirm a relationship between Piciformes and Passeriformes.

36. Only the left carotid artery (Lowe 1946) - The anatomy of carotid arteries anatomy was described by Glenny (1955). He found a configuration in Passerines that included a left carotid artery only. He called this configuration "B-4-s" and also reported its occurrence in Piciformes, Coliiformes, Trochilidae, Nyctibidae, some Psittaciformes, and other birds. It cannot confirm a Passeriform/Piciform relationship.

E. Conclusions

Thirty-six traditional characters have been reexamined, using cladistic character criteria (e.g., Raikow 1982), to

assess their ability to corroborate a monophyletic group consisting of the Passeriformes and Piciformes. Fourteen of these characters were found to be invalid, either because of high variability within taxa (4 characters), or because of inadequate description (ten characters). Of the characters that were found to be inadequately described, the most intriguing was Lowe's (1946) "morphology of the median and lesser wing coverts." This was the only character of all 36 that was originally specified as being unique to the Passeriformes and Piciformes. Unfortunately, Lowe provided no further detail as to the precise nature of this "character."

Another 22 characters were found to be widespread within birds, including presence in at least several other orders. Many of these 22 characters were actually the predominant condition in birds. Even if polarity could be determined, these are of no use in assessing the relationship in question.

Most of these characters were proposed not as evidence of relationship, but as one of a series of elements which might, in combination, define a taxon after the fact. That is, conviction of relationship came first based on a loose gestalt approach, and description of identifying characters came second. Interestingly, diagnoses used by different workers showed little overlap of component characters, suggesting a recognition that no single character or group

of characters was particularly robust in identifying the pico-passerines.

It is possible to draw two sets of conclusions from this exercise. First, there is no current evidence to support a close relationship between Piciformes and Passeriformes. The supposed relationship between these orders appears to be based upon tradition alone, or upon some vague personal view of gestalt not expressed (or perhaps expressible) in the scientific literature. This conclusion is particularly interesting in light of recent studies of DNA-DNA hybridization between Passeriformes and other bird orders. These studies (Sibley and Ahlquist 1986a) conclude that the sister-group of Passeriformes is a large clade including the Columbiformes, Gruiformes, Charadriiformes, Falconiformes, Pelicaniformes, and other orders. The Piciformes are found to be paraphyletic (contra Simpson and Cracraft 1981, Swierczewski and Raikow 1981, Raikow and Cracraft 1983) and to have diverged from the Passeriformes earlier than many other lineages (see Part IV).

A second set of conclusions is more general and concerns the importance of continued reevaluation of traditional classifications, and of precise morphological description. A de-emphasis on morphology in ornithology compared to other taxonomic disciplines in this century has not helped avian systematics. It is surprisingly difficult

to determine the taxonomic distribution of any particular morphological character. Criticisms of classifications based on traditional morphology may bear more on the methods and rigor that have been applied than on the ability of avian morphology to reveal relationships. This latter aspect largely awaits testing.

III. The Description and Distribution of Passerine-type Syringeal Complexity in Birds

A general impression exists among ornithologists that syringeal complexity arose entirely within the lineage of passerine birds, perhaps even contributing through enhanced song ability to the order's broad and successful radiation (see Raikow 1986). Syringeal morphology has had an historic and continuing influence on passerine taxonomy. In contrast, the nonpasserine syrinx is characterized as simple and uniform across taxa (Ames 1971:133), and has had virtually no recent taxonomic influence.

Here, I show that a passerine level of syringeal complexity exists in several orders of "higher" nonpasserines. Some of these features had been noted in early literature and subsequently ignored; others are described here for the first time.

A. Introduction

Most passerine birds do possess complex syringes. Notable are the intrinsic musculature of oscines and the accessory cartilages of suboscines. These have been studied long, intensively, and fruitfully (e.g., Müller 1847, Setterwall 1901, Ames 1971, Lanyon 1985), and a complex syringeal terminology specifically restricted to

has evolved (Garrod 1877:507, but see Part I). The major features of passerine syringeal evolution were studied by Ames (1971) whose comprehensive review set the framework for subsequent discussions of syringeal morphology. Ames's study provides a major reference for the current work and shall be referred to repeatedly.

In contrast, the syrinx of nonpasserine birds has received relatively little systematic study, perhaps resulting in part from preconceptions of simplicity and taxonomic homogeneity. Most frequently, nonpasserine syringes were simply assigned to one of three classical 'types' with no further morphological description (see Part I). On the basis of an examination of only 6 genera of nonpasserines (3 woodpeckers, 2 motmots, 1 tody), Ames (1971) characterized their orders, and nonpasserines in general, as having a simple syrinx: a simple tracheo-bronchial junction; no accessory cartilages; and no intrinsic muscles. He called this the "pico-passerine" type syrinx.

Although many nonpasserine taxa do possess simple syringes, many others do not. Some elaborations are well known, for example the bulla of male ducks and the convoluted trachea found in a variety of taxa (e.g., Gruidae). Many other elaborations are present, and the syringes of most nonpasserine families can be distinguished. Some of these features and numerous other

elaborations (including tracheal septa, pouches, convolutions, etc.) were compiled by Beddard (1898) whose review remains the best comprehensive source for nonpasserine syringeal anatomy (and perhaps nonpasserine anatomy in general) and forms the second major reference source of this study. Baumel et al. (1979) also noted the occurrence of syringeal complexity in some nonpasserines.

The existence of syringeal complexity in nonpasserines is of interest for three reasons. First, careful description of new syringeal features may assist studies of syringeal biomechanics. The functional morphology of the syrinx remains poorly understood (see Gaunt and Gaunt 1985b).

Second, knowledge of the taxonomic distribution of a particular feature may aid studies of ecomorphology. For example, Gaunt (1983) has discussed the possible correlations between the presence of intrinsic muscles and vocal complexity, while Raikow (1986) has questioned interpretations of the possible influence of vocal complexity on taxonomic diversity. More accurate discussion of the distributions of syringeal and vocal complexity might assist such studies.

Finally, more precise descriptions of nonpasserine syringeal morphology present new characters with which to test traditional phylogenetic hypotheses. A large number of persisting phylogenetic enigmas exist within

nonpasserine birds. Debate continues as to the correct relationship of virtually every family and order, while the affinities of some orders, such as Coliiformes and Psittaciformes, are acknowledged to be nearly complete mysteries (Cracraft 1981). The sister group of the Passeriformes, an order that includes roughly half of all living birds, has long been assumed to be the Piciformes, but this relationship is not supported by current evidence (see Part II). The true sister-group of the Passeriformes remains one of the major questions of ornithological systematics.

The descriptions that follow lay the groundwork for further analysis from each of these approaches. This study responds to the facts and logic presented above: 1) syringeal morphology has played a long and useful role in passerine systematics; 2) elements of syringeal complexity, including aspects apparently similar to passerines, have been noted in some "higher" nonpasserine families but have never been thoroughly examined; 3) the relationships of higher birds, including ordinal and subordinal relationships of the passerines, remains poorly understood. Below, I describe the syringeal morphology of nonpasserine families that display passerine-type syringeal complexity with the primary intent of providing information of use to phylogenetic inference.

B. Methods

This study is based on the examination of over 600 syringeal specimens representing 360 species, 57 families, and 22 orders of nonpasserine birds (see Appendix). They were dissected from fresh or museum specimens according to techniques described by Ames (1971). Small syringes were removed along with a section of the esophagus; more robust syringes were removed alone. Syringes from museum specimens were stored in 70% ethanol; syringes from fresh specimens were placed in a 10% formalin solution for several days before transfer to ethanol. Syringeal specimens were "cleaned" (removal of fat, membranous material, pieces of esophagus, etc.) under a variable magnification (.7x-3x) Bausch & Lomb stereomicroscope.

During study, muscle configurations were examined using an iodine stain (Bock and Shear 1972) that aided observation of fiber direction of small muscles and differentiation of muscle from non-myological tissue. Although the basis for the stain reaction is not known, iodine colors fresh or preserved muscle a yellow-brown color. This coloring largely fades in water, alcohol, or under light, so that this phase of the staining procedure is entirely nondestructive and reversible.

Many specimens were cleared and double-stained for cartilage and bone. This procedure was adapted from techniques described by Dingerkus and Uhler (1977).

Briefly, cleaned specimens are immersed in an alcian-blue solution that stains cartilage. After washing and gradual transition from alcohol to water, the specimen is placed in an trypsin enzyme solution. Alternation with a 1% KOH solution may assist tissue degradation. When the non-stained tissues of the specimen are clear, but still intact, the specimen is immersed in a KOH/Alizarin Red solution. This stains bones a deep red/purple. Finally, specimens are transferred through a KOH-glycerine solution series and are stored in 95% or 100% glycerine (containing thymol to retard molds and bacteria).

This staining procedure has the double benefit of distinguishing between cartilage and bone, and of clarifying element configuration regardless of its type. Ames (1971) did not stain for muscle, bone, or cartilage. By application of these procedures to the same taxa studied by Ames, Lanyon (1985) has been able to distinguish syringeal configurations not seen, or described inaccurately by Ames (1971). Previously, only Lanyon (e.g., 1985, 1986) and Warner (1972a, 1972b) have stained syringes. Among nonpasserines, only pigeon syringes have been examined using staining procedures (Warner 1972b). Enzyme clearing does permanently eliminate details of myology so that rare specimens have not been cleared; availability of alcoholic specimens is a limiting factor that must be borne in mind. Information about passerine

syrinx morphology comes primarily from published literature, especially Ames (1971) and Lanyon (1985, 1986), but examination of syringes of some passerine taxa was made possible through the kindness of W. Lanyon.

Syrinx illustrations were constructed by tracing the image of a particular specimen with a camera lucida mounted on a Wild stereomicroscope.

Syrinx terminology generally follows Ames (1971) (but see Part I), particularly in regard to the designation of individual syringeal supporting elements as A- or B-type elements, and in regard to intrinsic muscle terminology (see Part I). Here, an intrinsic muscle is one that inserts and originates on or near the syrinx (see Part I). Ames (1971) did not define internal cartilage; here the term indicates a syringeal element attached to or embedded within the internal tympaniform membrane.

C. Results: Syringeal Descriptions

The term "higher birds" generally indicates the Passeriformes, Coraciiformes, Piciformes, often the Coliiformes, and variably the Cuculiformes, Apodiformes, Columbiformes, Psittaciformes, Strigiformes, and Caprimulgiformes. This group corresponds roughly to the Anomalogonatae (birds lacking the ambiens muscle) of Garrod (1873), which may indicate one source for the association. In this section, I describe the syringeal structure of taxa

of higher birds that have passerine-type syrinx specializations: primarily intrinsic musculature and internal cartilages. Taxa not specifically discussed below do not possess these features, although their syringes may be derived or complex in other respects. The phylogenetic implications of structures described here are discussed at greater length in Parts IV and V.

Piciformes

Based on an examination of syringes of three genera of one family (the Picidae), and a review of Beddard (1898), Ames (1971) characterized the syrinx of the Piciformes as "a slightly modified tracheo-bronchial junction" lacking intrinsic muscles or other elaborations. Ames did cite references by Beddard (1898) to "intrinsic muscles" in the Piciformes, but, alluding to differences in terminology, Ames attributed these to M. tracheolateralis "in all cases."

I have examined 86 piciform syringes, representing all 6 families of the order (see the Appendix for specifics of all specimens examined). Each family has diagnostic syringeal features. These do not conform in all respects to Ames's pico-passerine syrinx criteria (hence, perhaps, his reference to a "slightly modified" tracheobronchial junction), but he is generally correct in characterizing the syrinx of this order as simple.

There is one possible exception. In his discussion of the Ramphastidae, Beddard (1898:191) noted the presence of structures suggestive of internal cartilages: "separate rounded bits of cartilage" apparently embedded in the internal tympaniform membrane. Ames (1971) did not mention this point.

I have examined 12 toucan syringes, representing 5 genera. In these, the ventral tips of adjacent incomplete A-elements show some fusion. The internal tympaniform membranes surrounding these areas of fusion retain alcian blue stain, indicative of cartilage. These regions of stain show some local concentrations but no well-formed cartilages were detected. The position and nature of these formations are unlike any structures observed in passerine or other orders. It is tempting to regard these as a step in the evolution of internal syringeal elements.

I did not find other evidence of internal elements, intrinsic musculature, or other passeriform-like syringeal features in other members of the Piciformes.

Coraciiformes (including Trogonidae)

Ames (1971:133) examined syringes from three coraciiform genera representing two of ten families, and found them to be simple in structure. Again, he reviewed descriptions by Beddard (1898) and attributed references to intrinsic muscles as referring to M. tracheolateralis "in

all cases". He characterized the coraciiform syrinx as simple and suggested that the postulated ancestral "pico-passerine syrinx" was also present in early Coraciiformes.

I have examined 58 coraciiform syringes representing 28 genera and 35 species from all 10 families. Again, although syringeal autapomorphies are present for families and some genera, the general form of the coraciiform syrinx conforms to Ames's (1971) characterization. However, the following exceptions should be noted:

Momotidae: Syringes of all Momotidae examined (3 of 6 genera) bear large cartilaginous projections inserting dorsally upon their internal tympaniform membranes (Fig. 1). These were described and figured by Garrod (1878). Strangely, Beddard (1898:210) cited Garrod (1878) but did not mention the distinctive cartilaginous flanges. Murie (1878), in his review of the anatomy of motmots, specified the number of tracheal and syringeal rings but also neglected to mention the existence of flanges. Ames (1971) either was not aware of them, or considered them irrelevant to his assessment of the primitive passerine syrinx (as well they may be).

These dorsal projections appear to be dorsomedial extensions of a fusion at the dorsal tips of A-2 and A-3. The A-elements are ossified but the dorsal extensions are

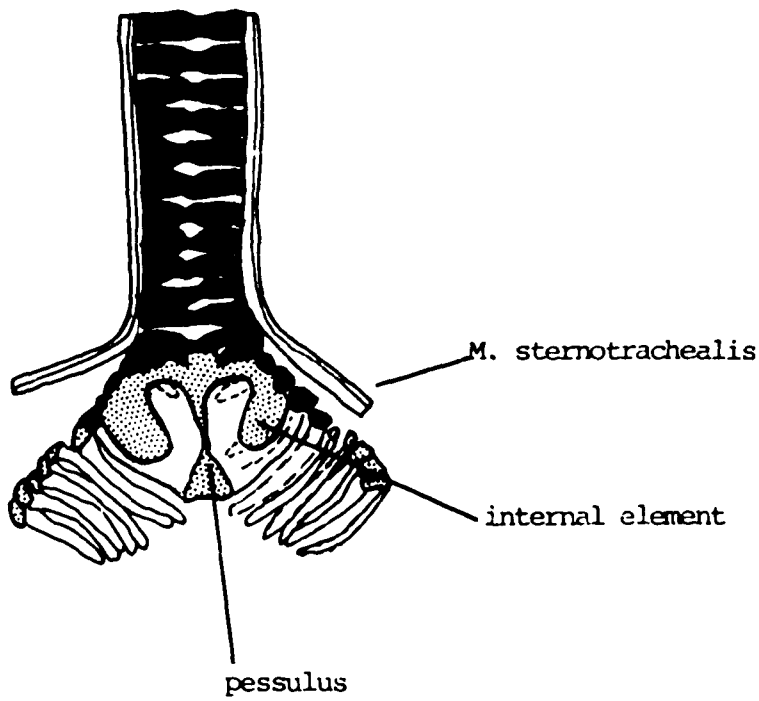

Figure 1. Syrinx of Eumomota superciliosus (Momotidae); dorsal view; 3.8x; AMNH #8293. Shaded areas indicate bone; stippled areas indicate cartilage.

cartilaginous. In Eumomota these are short, simple recurved rods. In Barypthengus and Momotus they are broadly expanded in the plane of the membrane, forming a spectacular of syringeal supporting structures.

These internal "flanges" are not closely similar in structure to the internal elements found in the Tyrannidae, and undoubtedly were independently derived; a synapomorphy for the Momotidae. Still, in a descriptive sense, these flanges are internal syringeal elements, as defined by Ames (1971) and McKitrick (1985). It may be that they serve a similar function as tyrannid internal elements, perhaps effecting the tension of the internal tympaniform membrane which is believed to be the primary sound source in the syrinx (Greenewalt 1968).

Alcedinidae: Ames (1971:133), citing Beddard (1898), stated that Coraciiformes lacked intrinsic musculature. In fact, some kingfishers do possess intrinsic musculature (see Fig. 2) and Beddard (1898:200) did note this, referring to two pairs of intrinsic muscles in Dacelo cervina and Ceryle alcyon: "the most anterior is the more slender; the wider muscle arises from the trachea, just where the extrinsic muscles are given off, and is attached to the first and apparently also the second bronchial semi-ring." These are apparently M. tracheolateralis and a true intrinsic muscle (see Part I), respectively.

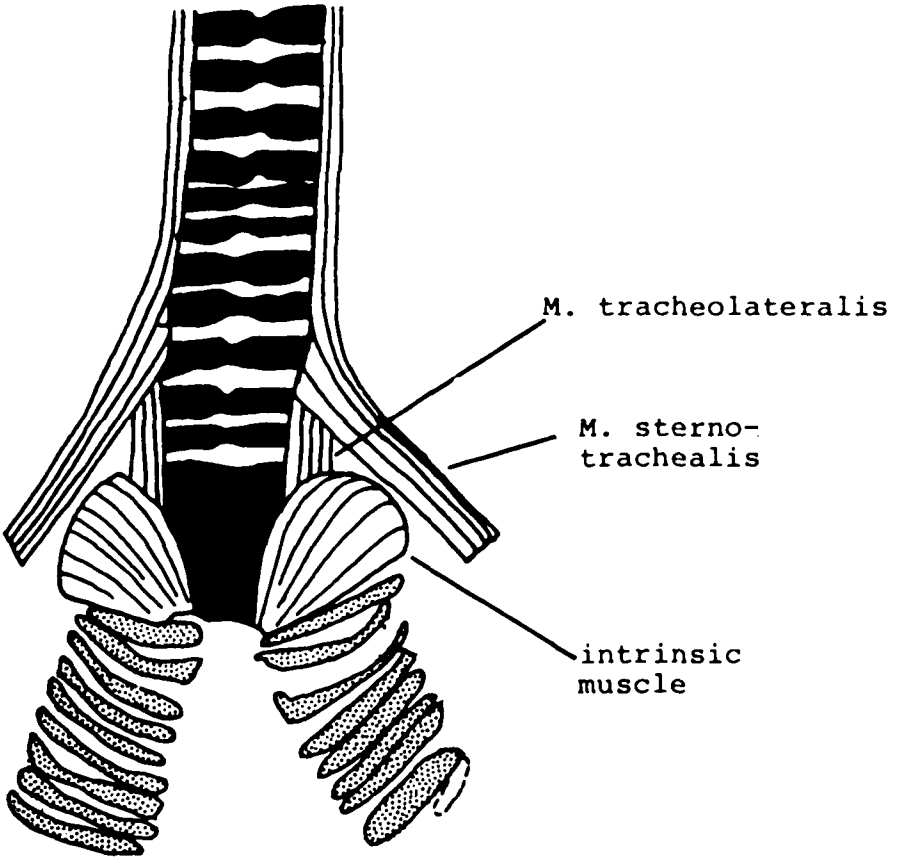

Figure 2. Syrinx of Ceryle alcyon (Alcedinidae); ventral view; x8.5; AMNH #4169. Shaded areas indicate bone; stippled areas indicate cartilage.

Müller (1847) had also noted intrinsic musculature in kingfishers; he illustrated these for Chloroceryle americana ("Alcedo cabanasii"). Müller did not illustrate M. tracheolateralis or M. sternotrachealis for Alcedo, both of which are present. Kingfisher syringes have not been subsequently described or illustrated.

Of 10 (of 14) genera examined by me, four (Ceyx, Alcedo, Clytoceyx, Ispidina) lack intrinsic musculature. Interestingly, these represent three of four genera of the kingfisher subfamily Alcedininae (Fry 1980). Six genera (Ceryle, Dacelo, Melidora, Halcyon, Tanysiptera, Chloroceryle) do possess conspicuous intrinsic muscles (Fig. 2). These are similar in originating at and around M. tracheolateralis on the lateral surface of the trachea. Fibers radiate caudally to insert dorsally and ventrally along the length of the incomplete A-elements. In specimens of Ceryle spp., many fibers extend dorsoventrally and may be continuous from one end of the incomplete A-element to the other. Although primarily single, radiant muscle masses, this configuration closely resembles Ames's (1971:140) "balanced dorsal and ventral muscles," that he described for all Dendrocolaptidae, Furnariidae, two Pipridae (Corapipo and Chiroxiphia), Menurae, and oscines. He suggested independent derivations from M. tracheolateralis. The occurrence in kingfishers of this muscle type would presumably represent a separate

independent derivation. The variable configuration of these fibers within Alcedinidae agree with Ames's (1971) conclusion of a derivation from M. tracheolateralis.

Coliiformes

I have examined five specimens representing two species of the single genus of Mousebird, Colius. Although these two species represent both proposed subgenera of the family (Rich and Haarhoff 1985) the five syringes are structurally uniform. They possess typically configured extrinsic muscles on an ossified trachea and syrinx with cartilaginous bronchi. They are, however, unusual within birds in the following respects (see Fig. 3):

1. They posses a pair of dorsal internal syringeal elements. These are straight cartilaginous structures that project caudally from a dorsomedial plate that is also composed of cartilage. The elements surrounding this medial plate, to which it is fused, are ossified. These are simple, without curves or elaborations, and are on the surface of, or embedded within the internal tympaniform membrane. The position and configuration of these elements is not dissimilar to those of tyrannids (see Fig. 4), although no tyrannids are known to attach in as medial a position in contrast to illustrations by Ames (1971) (pers. obs., Lanyon pers. comm).

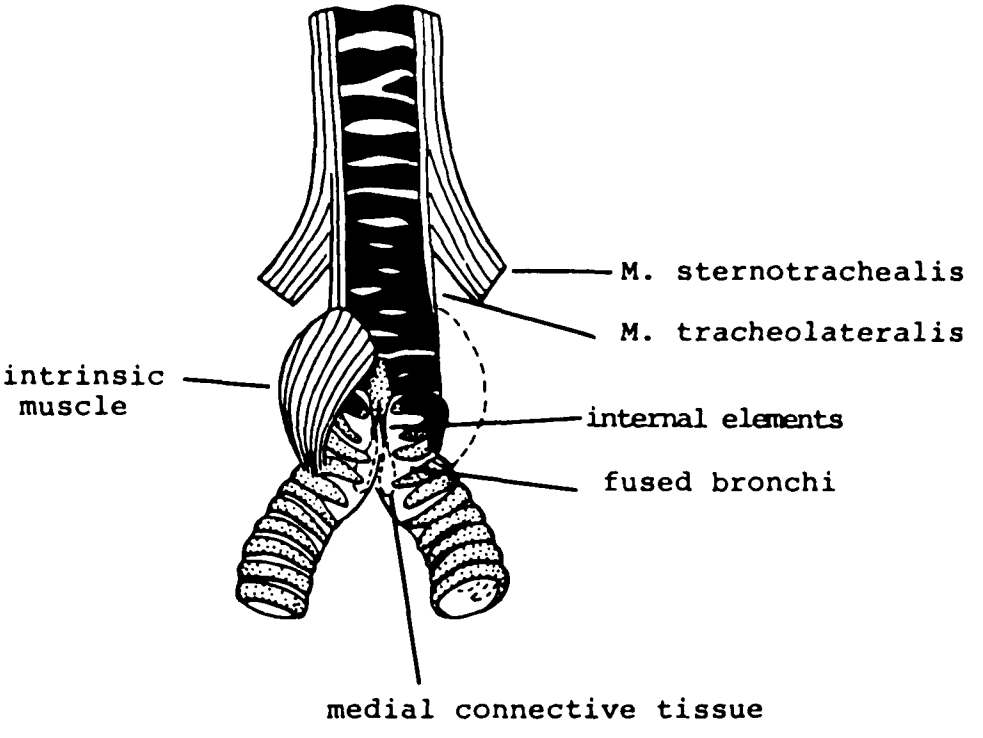

Figure 3. Syrinx of Colius striatus (Coliidae; dorsal view; x 6.5; AMNH #4255. Right intrinsic muscle has been dissected away. Shaded areas indicate bone; stippled areas indicate cartilage.

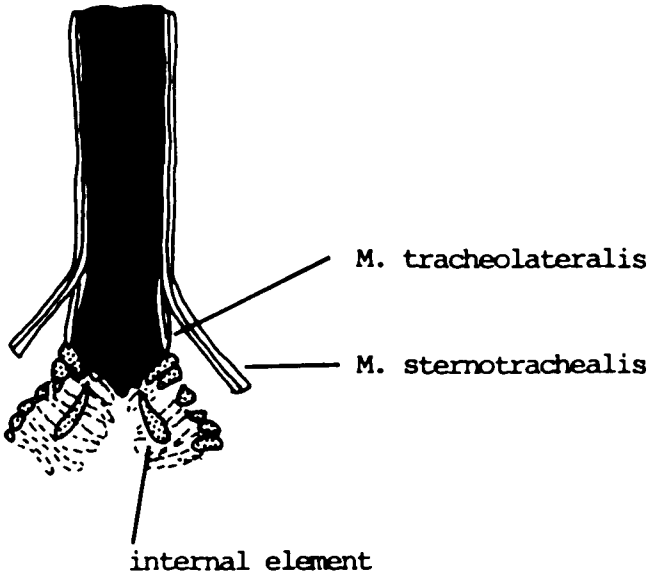

Figure 4. Elaenia martinica (Tyrannidae); dorsal view; 5.8x; Carnegie Museum #1065. Shaded areas indicate bone; stippled areas indicate acrtilage.

2. Continuous with the caudal tip of the internal cartilages is a region of connective tissue that extends ventromedially along the internal tympaniform membrane. Histological examination will be necessary to determine the nature of this tissue; it may be muscle, fat, or of another composition. This region only becomes visible in cleared specimens, but the clearing process also causes degeneration of the connective tissue.

3. One incomplete element is broadened laterally and widely forked towards its dorsal end. This element may be B-1 (see Ames 1971), as it is thicker and rounder than other tracheal rings, but its specific homology is difficult to determine. It is ossified, while all caudal rings are cartilaginous.

4. In addition to normally configured M. tracheolateralis and M. sternotrachealis, colies possess a paired intrinsic muscle with dorsal and ventral branches. In contrast to the Alcedinidae (see Fig. 2), these fibers run essentially along the axis of the syrinx. The dorsal branch originates broadly from a dorsomedial tracheal position (where right and left branches are in contact) to a lateral position overlying M. tracheolateralis. It inserts dorsolaterally along the bronchial surface. The ventral branch originates laterally along the trachea overlying M. tracheolateralis

and inserts along the ventrolateral edge of the bronchi, descending further caudad than the dorsal branch.

5. The bronchi do not diverge directly from the syringeal region, but are joined together for a short extent before diverging. This condition has not been previously described for any syrinx and shall be referred to as "fused bronchi."

Müller (1847) described and figured a coly syrinx that clearly included intrinsic musculature and an approximation of the broadened forked element described above. He did not include M. tracheolateralis in his drawings. Garrod (1876), citing Müller, said that the coly syrinx is "most nearly related to that of Ceryle among the kingfishers" perhaps referring to the shared conspicuous intrinsic musculature found in both genera (despite their different configuration). Beddard (1898:202), also citing Müller, called the coly syrinx "quite typically tracheo-bronchial." While typically tracheo-bronchial in the sense that the vibratory membranes and other specialized structures are located at the bifurcation of the bronchi from the trachea, the coly syrinx is not typical in any other sense. Nevertheless, Pycraft (1901:239) also called the syrinx "of the typical tracheo-bronchial type." The coly syrinx has not been

subsequently described or illustrated.

Trochilidae

I have examined 9 specimens representing 8 of 116 genera of hummingbirds. These are generally uniform in structure, although the size and insertion of M. tracheolateralis shows variation. In most species it is reduced and inserts laterally; in Patagonia gigas it is large and inserts in ventral and dorsomedial branches. Syringeal uniformity in hummingbirds has also been noted by Zusi (pers. comm.).

The primary points of interest concerning the trochilid syrinx are as follows (see Fig. 4):

1. The syrinx is within the neck, not within the thoracic cavity. The entire syrinx is encased in a membrane sheath. Several of the following features may result from or be correlated with this unique position.

2. Although the entire trachea and syrinx is ossified in most adult birds, in hummingbirds ossification is restricted to the syrinx itself.

3. The tracheal rings are not uniform in width. Although they are in contact with one another along the lateral surfaces of the trachea, each ring narrows over the entire

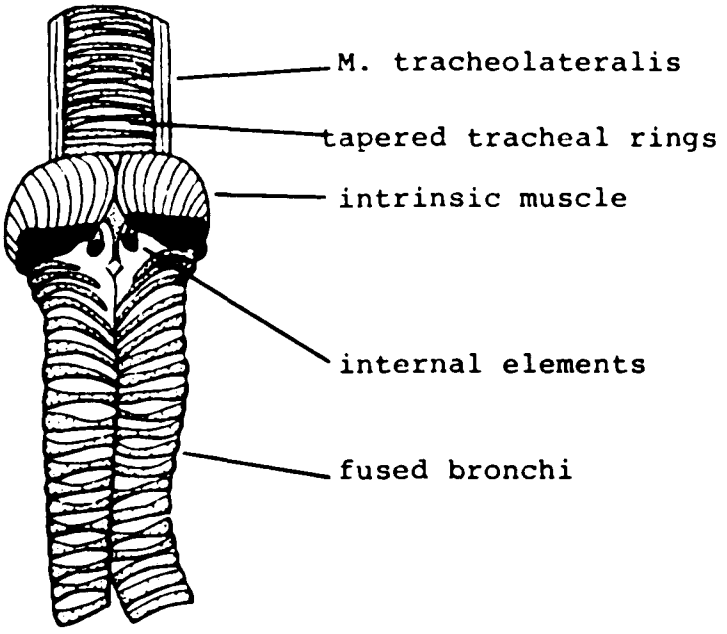

Figure 5. Syrinx of Hylocharis cyanus (Trochilidae); dorsal view; x15; AMNH 8072. Shaded areas indicate bone; stippled areas indicate cartialge.

dorsal and ventral surface of the trachea. There is membrane across the intervening spaces in these regions.

4. Hummingbird syringes possess a pair of dorsal internal elements located at the position of bronchial bifurcation and embedded within the internal tympaniform membrane. They are of a unique form, consisting of an ossified knob attached by soft cartilaginous membrane to the caudal edge of the drum. The knob may bear an ossified or cartilaginous extension that projects ventrally along the internal membrane surface.

5. One ring element, perhaps B-1 (ring homology is uncertain), broadens dorsally to an arrowhead-shaped tip, sometimes (as in Phaethornis ruber) very widely. This broadened area is ossified, but the rest of the ring is cartilaginous.

6. There is a large and conspicuous intrinsic muscle mass, composed of two paired muscles. The larger of these originates along the caudal edge of the broadened B-element and inserts from the dorsal tracheal surface all the way around to a ventromedial raphe. A second, more slender muscle originates ventromedially just caudad to the ventral bifurcation region and inserts at the lateral edge of the expanded B-element. M. tracheolateralis is also present,

overlying the larger intrinsic muscles.

7. The M. sternotrachealis muscle pair has been lost.

8. The bronchi are attached along a considerable length after divergence from the syrinx, perhaps 15 or more rings. This attachment is along the interior bronchial surface, but also by enclosure within the membranous sheath that encloses the entire syrinx.

A hummingbird syrinx, Trochilus dominicus, was illustrated by Müller (1847) who included intrinsic musculature, internal cartilages and the broadened B-element described above. He did not include M. tracheolateralis, which hummingbirds do have. Despite Müller's description, Huxley (1867:469) described the hummingbird syrinx as having "not more than one pair of intrinsic muscles" (presumably M. tracheolateralis). Beddard (1898:227 ff.) described the unusual bifurcation of the trachea high up in the neck and the consequently long bronchi. He also mentioned "two pairs of extrinsic muscles, which form a prominent muscular mass, as in Passeres." He presumably meant "intrinsic" muscles. Beddard also noted the absence of M. sternotrachealis.

Note that neither swifts (Apodidae), crested swifts (Hemiprocnidae), owls (Strigiformes), or goatsuckers

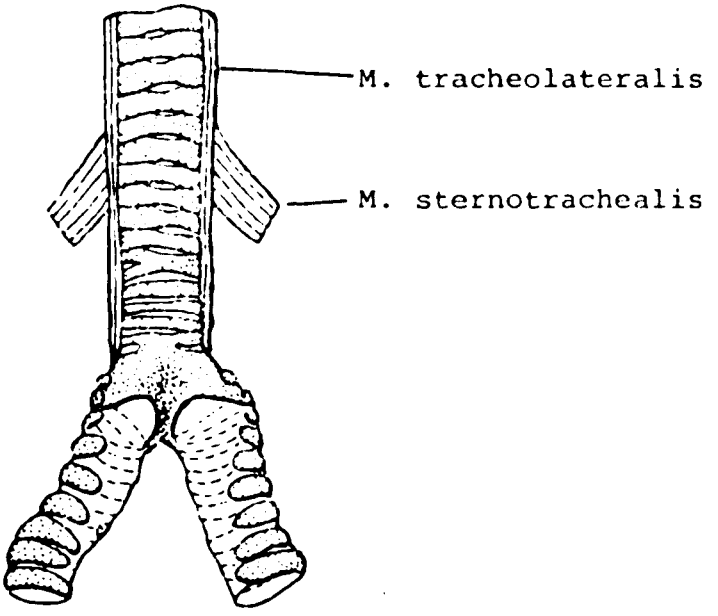

Figure 6. Syrinx of Aeronautes saxatilis (Trochilidae); dorsal view; x6; AMNH #8614. Stippled areas indicate cartilage.

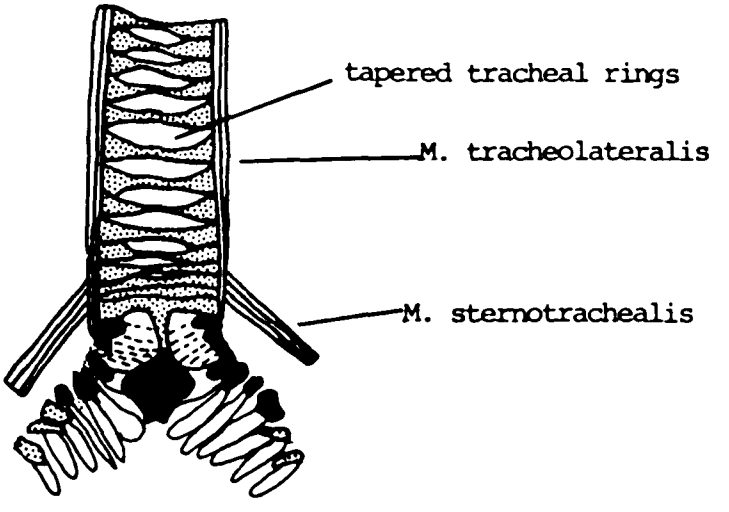

Figure 7. Syrinx of Uropsalis segmentata (Caprimulgidae); dorsal view; x6; USNM #512012. Shaded areas indicate bone; stippled areas indicate cartilage.

(Caprimulgiformes) possess internal elements, intrinsic musculature, or other aspects of passerine type syringeal complexity (see Figs. 5, 6).

Psittacidae

I have examined 29 specimens representing 11 out of 64 genera of parrots. These are of a uniform nature except in size. The morphology of parrot syringes is highly derived (see Fig. 5). The A-1 elements are flattened dorsoventrally such that the syrinx at this point is extremely narrow. These elements curve sharply caudally at their dorsal and ventral tips. Between these "hooks" extends an external tympaniform membrane which has embedded within it a cartilaginous bar detached from other structural elements. This may represent a modified B-element. A-elements are fused into a drum with sharp ventromedial and dorsomedial projections. There are no internal cartilages. Additional points of particular interest are:

1. M. sternotrachealis is a robust lateral muscle but it narrows to a tendon that inserts on the membrane of the lung (Beddard 1898) or on a membrane overlying the intrinsic muscle M. tracheobronchialis. This insertion is unique.

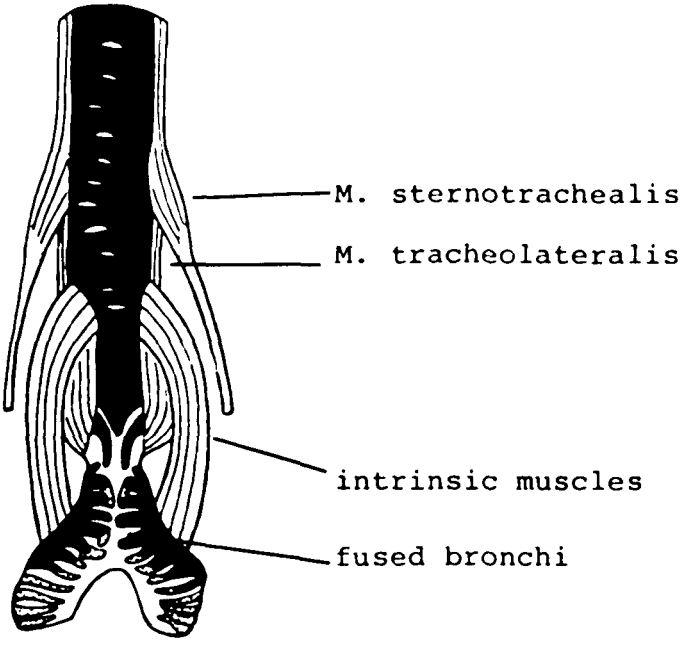

Figure 8. Syrinx of Poicephalus senegalus (Psittacidae); ventral view; x 3.25; AMNH #8304. Shaded areas indicate bone; stippled areas indicate cartilage.

2. There are two stout, paired intrinsic muscles. Gaunt and Gaunt (1985a) called these M. syringeus and M. tracheobronchialis. M. syringeus originates laterally on the drum of the trachea and inserts on the external tympanic membrane. M. tracheobronchialis originates laterally on drum of the trachea just cephad to the origination of M. syringeus. It inserts laterally on the bronchi (and hence overlies M. syringeus).

3. The bronchi do no not diverge directly from the syrinx, but are fused, in a configuration similar to that of colies.

The morphology of the psittacid syrinx has been carefully described by Gaunt and Gaunt (1985a) who used it as a model for understanding phonation in birds with complex syringes. They detail the configuration of bony and cartilaginous elements and the origin and insertion of the two extrinsic and two intrinsic muscle pairs. Beddard (1898:255 ff.) also described the structural elements of the parrot syrinx in some detail, but barely mentioned the musculature. He did note a single "intrinsic muscle" but which muscle he meant, M. tracheolateralis or a "real" intrinsic muscle, is not clear. He also noted the reduction of M. sternotrachealis and its attachment not to the sternum but to the lung membranes.

D. Conclusions

Despite a general impression of simplicity and uniformity in nonpasserine syringes, I have described complex specializations in five nonpasserine orders. Some of these features have been previously described and some have not. My discussions above have been limited only to "passerine-type" syringeal complexity, primarily intrinsic musculature and internal syringeal elements. Syringes of "higher" bird taxa and other birds contain many other types of specialization; I have noted that the syringes of most nonpasserine families contain diagnostic features. During the nineteenth century and early twentieth century, some of the features had been noted. More often syringes (and other anatomical features) were assigned to a type (e.g., tracheal syrinx, bronchial syrinx, tracheobronchial syrinx) without further description. The avian syrinx appears to display variation across the avian class. This structural diversity should be of interest to functional anatomists, ecomorphologists, and systematists. However, before analysis and interpretation must come description. Syringeal morphology awaits description for most bird species.

IV. Syringeal Complexity and the Ordinal Relationships of "Higher" Birds

A. Introduction

The history of higher bird taxonomy has been reviewed by Sibley (1970) and Sibley and Ahlquist (1972). They, and other systematists (see Cracraft 1972, 1981; Raikow 1982; Cannell, Part II), have emphasized the weak support underlying current avian classifications (see esp. Sibley and Ahlquist 1983:288). Relatively few avian taxa are supported by precise hypotheses. Even those nodes that have received recent reexamination and support are typically supported by three or less characters, and frequently by single characters. The significance of such nodes is questionable, even without homoplasy (see Felsenstein 1985). There is urgent need for additional description, comparison, and analysis of the morphology of birds.

The syrinx has played a long and fruitful role in avian systematics (e.g., Müller 1847, Ames 1971, Lanyon 1986), but much of this study has focused on the Passeriformes. Below, I summarize and discuss evidence from the syringeal morphology of nonpasserine birds that bears on questions of the phylogeny of "higher" birds.

B. Methods and Methodology

In the following pages, I compare derived syringeal characters to existing hypothesis of relationship which have been formed from other evidence. I follow a cladistic methodology (see Wiley 1981, Cracraft 1985). Hypotheses of derived character homology are equivalent to hypotheses of relationship of the taxa possessing them. When syringeal morphology and independent evidence are congruent, then confidence in a hypothesized pattern of relationship is increased. When syringeal morphology and other morphological characters are in conflict, then homoplasy exists. The most parsimonious hypothesis is preferred, although when the number of characters is very small this preference may be insignificant (see Felsenstein 1985). Parsimony is a methodology of analysis, not a comment on evolutionary processes (Sober 1985).

I compare syringeal morphology with hypotheses from two independent sources of evidence. The first is published information about nonsyringeal morphology. The second is recent results from DNA-DNA hybridization studies (e.g., Sibley and Ahlquist 1985b, 1986a). Here, I discuss methodological aspects of the these three types of evidence.

Syringeal Morphology

Only birds possess structural specializations (a

syrinx) at the tracheobronchial bifurcation (see Part I). Hence, all syringeal specializations are derived within birds. Here, a broad comparative survey of avian syringes has been made (see Part III, Appendix) so that the taxonomic distribution of syringeal characters is known. Because of its widespread occurrence, including early avian offshoots such as ratites and Anseriformes (see Stapel et al. 1984, Sibley and Ahlquist 1985b), a simple syrinx is postulated to be primitive for the the taxa under study here. This assumption is similar to that made by Ames (1971) for passerines. Ames's assumption has been discussed in Part III, and will be discussed further below.

The syringeal characters employed here, derived from Part II, are summarized in Table 5. I do not include characters that are unambiguously restricted to particular families or orders. For example, loss of M. sternotrachealis is unique to the Trochilidae within birds. This loss is important in establishing the monophyly of the hummingbirds, but not in determining their relationships to other taxa. This examination focuses on the relationships between higher taxa.

The functional morphology of the syrinx is poorly known, although important advances have been made in recent years (e.g., Gaunt 1983, Gaunt and Gaunt 1977, 1985a, 1985b). One school of systematic thought prescribes that function must be known before the possibilities of homology

Table 5. Summary of Morphological Characters.

	Characters[1,2]									
Taxa	1	2	3	4	5	6	7	A	B	C
Columbiformes	-	-	-	-	-	1	-	-	-	-
Psittaciformes	-	1	-	1	-	-	1	1	-	-
Cuculiformes	-	-	-	-	-	-	-	-	-	-
Strigiformes	-	-	-	-	-	-	-	-	-	-
Aegothelidae	-	-	-	-	1	-	-	-	1	?
Caprimulgidae	-	-	-	-	1	-	1	-	-	1
other Caprimulgiformes	-	-	-	-	-	-	-	-	-	?
Apodidae	-	-	-	-	1	-	-	-	1	1
Hemiprocnidae	-	-	-	-	1	-	-	-	1	?
Trochilidae	1	1	-	1	1	-	1	-	1	1
Coliiformes	1	1	1	1	-	1	-	1	-	?
Trogonidae	-	-	-	-	-	1	-	-	-	-
Todidae	-	-	-	-	1	-	-	-	-	-
Alcedinidae	-	(1)	-	-	(1)	-	-	-	-	-
Momotidae	1	-	-	-	-	-	-	-	-	?
other Coraciiformes	-	-	-	-	-	-	-	-	-	-
Galbulidae	-	-	-	-	1	-	-	-	-	?
Bucconidae	-	-	-	-	1	-	-	-	-	?
Ramphastidae	1?	-	-	-	-	-	-	-	?	-
other Piciformes	-	-	-	-	-	-	-	-	-	-
Acanthisittidae[3]	(1)	-	-	-	-	-	-	-	?	?
Pittidae	-	-	-	-	-	-	-	-	-	-
Eurylaimidae	-	-	-	-	-	-	-	-	-	-
Philepittidae	(1)	-	-	-	-	-	-	-	-	?
Tyranni	1	1	(1)	-	-	(1)	-	-	-	-
Thamnophili	-	1	-	-	-	1	-	-	?	?
Furnarii	-	1	-	-	-	1	-	-	-	-
Passeres	-	1	-	-	-	(1)	-	-	-	-
waterbird assemblage	-	-	-	-	-	-	(1)	-	-	-
all other birds	-	-	-	-	-	-	-	-	-	-

[1] "-"=character is absent in taxon; 1=character occurs throughout taxon; (1)=character occurs in some members of taxon (see text); "?"=status unknown.

[2] 1=internal syringeal elements; 2=intrinsic muscles; 3=medial connective tissues; 4=fused bronchi; 5=reduced ossification; 6=loss of the pessulus; 7=tapered tracheal rings; A=extensor digitorum longus branch to hallux; B=cruciform splenius capitus; C=reduced MDH mobility.

[3] Nomenclature of passerines follows Sibley and Ahlquist (1985a).

or convergence can be assessed. That philosophy is not endorsed here. I believe that knowledge of function may help explain why a particular morphological transformation has occurred, but is not a prerequisite to an understanding of homology and relationship. The latter is the process of phylogenetic inference and is based on a process of compiling and comparing character state distribution and congruence.

Non-syringeal Morphology

I include here only those morphological characters that fulfill criteria requiring derivation (although perhaps more than once) within "higher" birds. First, the distribution of a character across birds must be known. I do not discuss characters described within only a few taxa but whose broad distribution awaits definition. Second, the character must be known to be absent in reptiles and primitive birds. Here, I accept ratites, Galliformes, and Anseriformes as primitive birds (see Stapel et al. 1984, Sibley and Ahlquist 1985b).

Few phylogenetic studies of "higher" birds have fulfilled these criteria. Following cladistic procedures, Raikow (1982) has corroborated the monophyly of the Passeriformes. Simpson and Cracraft (1981) and Swierczewski and Raikow (1981) have corroborated the monophyly of the Piciformes. Maurer and Raikow (1981)

found weak support for the monophyly of the Coraciiformes. Here, these findings are accepted. In analysis, these clades are maintained as monophyletic groups. Additional non-syringeal characters whose broad distribution is known are summarized in Table 5, and discussed in the text.

DNA-DNA Hybridization

In contrast to morphology, studies based on recent biochemical techniques such as DNA-DNA hybridization (see Sibley and Ahlquist 1983, 1986a) have been able to offer a comprehensive dendrogram for birds, a feat unthinkable to a morphological systematist. Phylogenies produced from DNA-DNA hybridization studies appear to show reasonable congruence with results from cladistic morphological studies (see Sibley and Ahlquist 1983, Raikow 1985), and Britten (1986:1395) has compared hybridization results favorably with the more rigorous technique of DNA sequencing.

Still, the value of DNA-DNA hybridization to phylogenetic inference remains in question (see Cracraft, in press; Houde, in press), particularly as even recent results have been somewhat unstable (cf. Sibley and Ahlquist 1985b, Sibley and Ahlquist 1986a). An effect of generation time on the rate of DNA change (contra Sibley and Ahlquist 1983) has only recently been discovered and effects on a phylogenies have not yet been thoroughly

assessed..

Sibley and Ahlquist (1986b) have stated that "DNA comparisons give a direct indication of the branching pattern and the approximate branching dates among living lineages." Although DNA-DNA hybridization results clearly contain phylogenetic information and are of great interest to ornithologists, few avian systematists accept the strength of that statement. Here, I discuss DNA-based phylogenies as hypotheses. In many analyses below, these serve as a useful initial topology.

Analytic Approach

Because we know so little about the higher level phylogeny of nonpasserines (see above), choice of outgroup is often largely arbitrary. For example, many studies of passerine birds have used members of the Piciformes as comparative material although there is no evidence that Passeriformes and Piciformes are even closely related (see Part II). Since outgroups are used to define the polarity of characters, an incorrect outgroup may affect interpretations of phylogeny and homology (see Wiley 1981, Meacham 1984, Swofford 1984). Much of the discussion below is a presentation of the effects on hypotheses of phylogeny of choices of alternative outgroups and interpretations of homology. These should be regarded as speculative exercises, not definitive arguments.

A cladistic computer program, MacClade (Maddison 1986), has been used to assist in comparing phylogenies. In theory, manual results would not differ except in time required to produce them; in practice computer searches of alternative trees are so extensive and tree length calculations so fast that these could not or would not be accomplished manually. Of course, both manual and computer results depend upon the accuracy of the characters that are employed.

MacClade (Maddison 1986) is particularly appropriate for studies, such as this one, which primarily compare determined tree topologies, and which explore individual character evolution. The program allows visual display of character distributions in a manner superior to other phylogenetic computer programs (e.g., PAUP, Swofford 1985), although those may include more rigorous search algorithms. In MacClade, branches may be visually altered allowing immediate comparison of tree and character consistency indices. Also useful here, the program allows the state of a character to be fixed at a chosen branch.

Below, I use syringeal characters described in Part III (as summarized in Table 5) as a basis for testing current phylogenetic hypotheses.

C. Results and Analysis

Internal Syringeal Elements

Within the Passeriformes, Ames (1971) described the presence of internal elements in the Tyrannidae, and some Cotingidae, Pipridae, Oxyruncidae, Philepittidae, and Acanthisittidae. McKitrick (1985) hypothesized 3 or more derivations within the Passeriformes: within the Acanthisittidae, the Philepittidae, and at least once within the Tyranni. In Part III, I described internal elements in four nonpasserine taxa: the Trochilidae, Coliiformes, Ramphastidae, and Momotidae. These vary greatly in structure between taxa (see Part III).

The structure of the momotid and ramphastid internal elements are most divergent, and on the basis of similarity, unlikely to be homologous with those features in passerines. As noted, the internal elements of toucans are scarcely present and may not deserve the term.

The internal elements of colies and hummingbirds are also quite different from passerine internal elements, but share some similarities. Internal elements in hummingbirds attach to the dorsal tips of the A-elements in a manner similar to that of tyrannids. The internal elements of colies are of a similar configuration to those in tyrannids, but the attachment point, to a dorsomedial plate, is not closely similar. However colies and some

tyrannids do share an extension of the internal elements into a medial connective tissue (see below).

The distribution of internal syringeal elements is displayed in Figure 9, superimposed on the phylogeny of birds derived from DNA-DNA hybridization (Sibley and Ahlquist 1986a). This tree topology has a total length of 38 steps. It postulates 7 independent derivations of internal syringeal elements (assuming a single derivation within the Tyranni). Because of structural dissimilarity, it is likely that internal elements were independently evolved in the Ramphastidae and Momotidae. However, structural similarities between internal elements in the Coliidae, Trochilidae, and Passeriformes suggest the possibility of alternative hypotheses of relationship:

1. Hummingbirds and Colies: A postulated monophyly between hummingbirds and colies can be constructed in two ways. The first is to move the trochilids from the clade including the Hemiprocnidae and Apodidae, and positioning them as a derivation of the Coliidae lineage. When this change is made, the total tree length remains stable at 38 steps. Although this topology conflicts with data from DNA-DNA hybridization, it is just as parsimonious as the tree presented in Figure 9 in regard to morphological characters (but see discussion below). Hummingbirds and colies share internal elements, intrinsic musculature, and

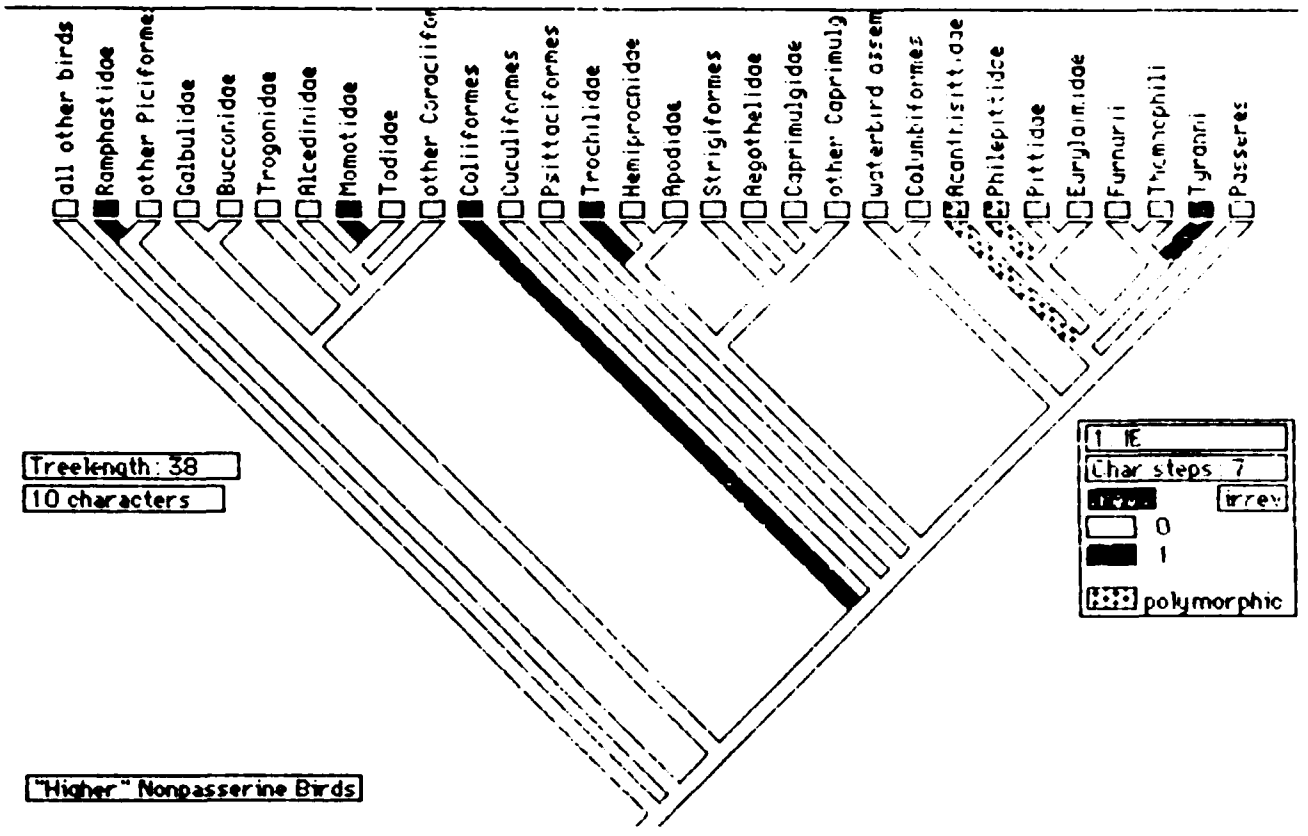

Figure 9. The taxonomic distribution of internal syringeal elements.

fused bronchi, although the specific configurations of these are somewhat different, as noted (Part III).

In fact, the relationship of swifts and hummingbirds has been considered one of the most perplexing questions in nonpasserine systematics (see Sibley and Ahlquist 1972, Raikow 1982). Cracraft (1981) argued that osteology offered "strong support for a sister-group relationship" of swifts and hummingbirds, particularly because of similarities in cranial osteology for which convergence becomes a more difficult argument. But Cohn (1968) argued that osteological similarity was due to convergence. Neither author has published character descriptions.

A more specific hypothesis was made by Burton (1971) who found a particular "cruciform origin" to the splenius capitis muscle of the neck. He noted its occurrence in Apodidae, Hemiprocnidae, Trochilidae, Turnicidae, and Aegotheles. He did also find tendencies towards this configuration in numerous other groups, and called the configuration noted above "an exaggeration of a widespread tendency." He discussed the functional significance of this muscle and could not attribute its distribution to convergence alone.

Another specific character relevant to the removal of hummingbirds from the swift-crested swift clade is the electrophoretic mobility of malate dehydrogenase (Kitto and Wilson 1966). While nearly all of over 100 bird species

had malate dehydrogenase mobility of 100, all hummingbirds and swifts that were tested had a mobility of 63. These were the only birds with this mobility, although the single caprimulgiform tested also had a low mobility (of 27). Coliiformes, another group for which torpor has been reported (Bartholomew and Trost 1970), were not tested. Reduced malate dehydrogenase activity appears to be a second derived character linking Apodidae and Trochilidae.

Although tree length does not change in this analysis in moving the hummingbirds from the swift lineage to the coly lineage, it must be remembered that the structural configurations of each of the three syringeal characters shared between colies and hummingbirds are actually quite different in structural configuration. Since the total tree lengths are the same between these trees, the topology congruent with DNA data is preferred.

A second hypothesis that combines hummingbirds and colies in a monophyletic clade is one that positions both taxa as the sister group of the swifts and crested swifts. This topology, shown in Figure 10, actually exhibits a decrease in total tree length to 37 steps, combining those features described above that unite swifts and hummingbirds, and the syringeal features that unite hummingbirds and colies. This topology is in disagreement with the DNA data. Conflict between DNA-DNA hybridization and morphology are difficult to assess (see McKitrick

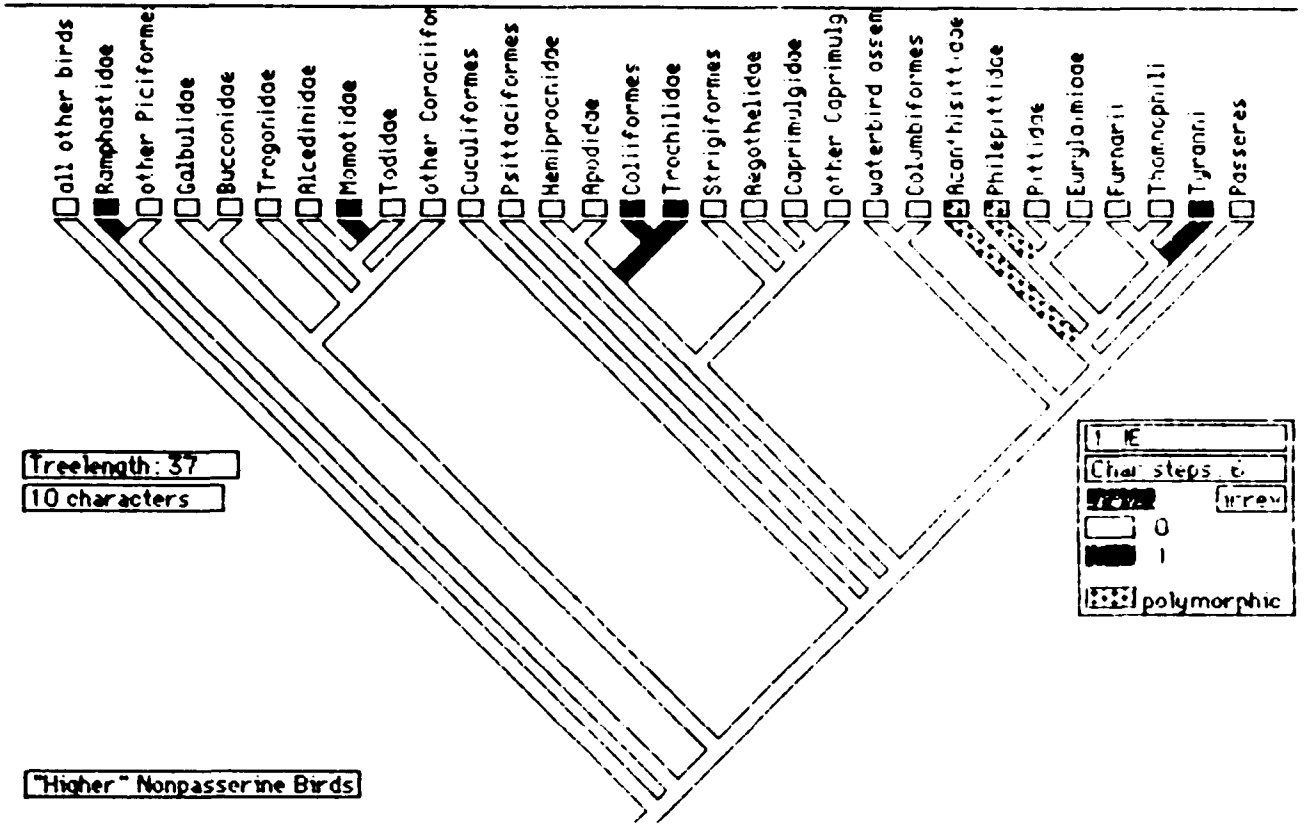

Figure 10. The monophyly of colies, hummingbirds, swifts, and crested swifts.

1985 and Part V).

2. Colies, hummingbirds, and passerines: Both colies and hummingbirds have historically been suggested as close relatives of the Passeriformes (see Sibley and Ahlquist 1972). When hummingbirds are hypothesized as the sister group of passerines, tree length increases to 41. When homology of internal elements is required, tree length increases to 43. These argue against hummingbirds as the sister group of passerines. When colies are hypothesized as the sister group of passeriformes, tree length remains stable at 38 steps. When homology of internal elements is required, tree length increases to forty steps.

These increases in both cases, plus the described structural dissimilarities, plus the evidence of DNA-DNA hybridization argue against these topologies, and against a homology of passerine and nonpasserine internal elements.

Intrinsic Syringeal Muscles

As reported in Parts I and III, intrinsic muscles occur in the Trochilidae, Psittaciformes, Coliiformes, Alcedinidae, and Passeriformes. The specific configurations of these muscles are not closely similar. But this configuration varies widely at lower taxonomic levels as well, as reflected in the confusing nomenclature in intrinsic muscles that has developed (see Ames 1971,

Baumel et al. 1979). Individual muscle configurations may form derived states for particular taxa within higher birds, and at the same time be homologous as intrinsic muscles at a higher taxonomic level. I test these possible homologies here.

1. Colies and parrots: Removal of the Trochilidae from the swift plus crested swift clade to the parrot clade has already been discussed and rejected as less parsimonious. However a monophyletic parrot-coly clade shows increased overall parsimony, with a total tree length of 35 steps (see Fig. 11).

The ordinal relationships of parrots and of colies have remained enigmatic. Beddard (1898:272) said that the determination of the affinities of parrots to other groups of birds is one of the hardest problems in ornithology." Similarly, Sibley and Ahlquist (1972) said about colies that they "seem to have no obvious ties to other passerine groups." Berman and Raikow (1982) did speculate as to coly relationships. They examined hind limb myology of colies and noted an unusual branch of the extensor digitorum longus tendon to the hallux. Although they do not specify in what other groups its absence has been noted, they report that this condition has been found in only one other order, the Psittaciformes.

Like colies, parrots use their legs and feet in

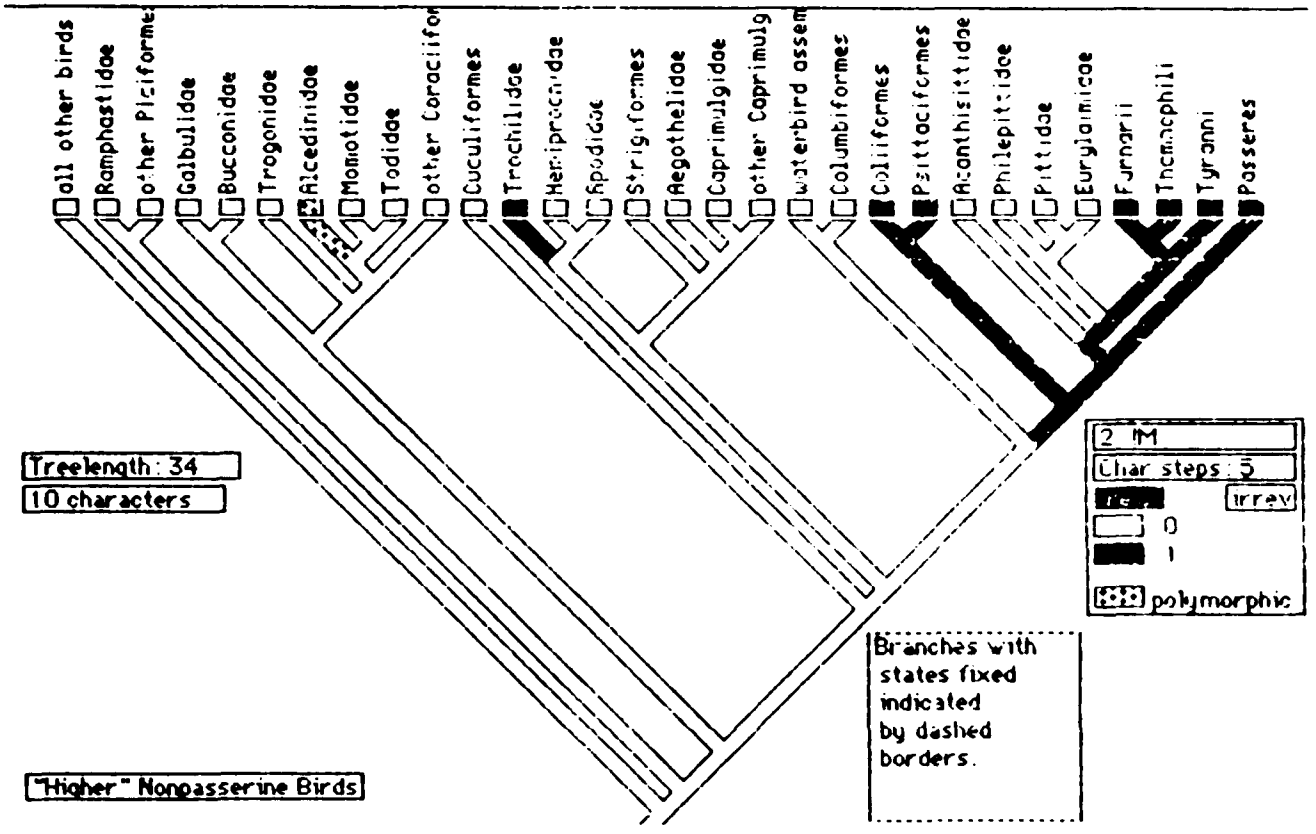

Figure 11. The monophyly of parrots and colies.

unusual ways. Berman and Raikow (1982) cautioned that similarity in foot structure may result from convergence; alternatively both foot structure and behavior may share a derived ancestry. Berman and Raikow (1982) conclude that: "although this character alone cannot demonstrate a common ancestry for the Coliiformes and Psittaciformes, it is more substantial evidence than any single feature previously offered in relating Coliiformes to other groups." Syringeal anatomy, particularly the similarly fused condition of the bronchi, would appear to corroborate a relationship of parrots and colies.

2. Parrots, colies, and passerines: Berman and Raikow (1982) did not speculate as to what taxa a hypothesized parrot-coly clade might be related. If the clade of parrots and colies is hypothesized as the sister group of the clade of swifts, crested swifts, and hummingbirds, a slight increase in tree length, to 35 steps, occurs.

If the clade of parrots and colies is hypothesized as the sister group of the passeriformes, and homology of intrinsic musculature is enforced, tree length remains stable. Hence, a hypothesis of intrinsic musculature as primitive for passerines, and homologous between passerines, parrots, and colies, is equally parsimonious as a hypothesis of a simple primitive passerine syrinx (lacking intrinsic musculature). This contradicts the

assumptions of Ames (1971) who based his interpretations of syrinx evolution on an assumption of a primitively simple passerine syrinx. Some weight may be given to the occurrence of intrinsic muscles by the presence of a drum (fused tracheal rings) in syringes of Acanthisittidae. Fusion in this region is normally associated with the attachment of intrinsic muscles. As Ames (1971:133) noted, "the presence of a drum in the Acanthisittidae suggests that the ancestors of this group might have possessed intrinsic muscles." The Acanthisittidae have been postulated as the earliest offshoot from the lineage of suboscine birds (Sibley and Ahlquist 1985b).

Medial Connective Tissue

In several tyrannid syringes that have been examined, the internal cartilages extend caudally along the internal tympaniform membrane as diffuse connective tissue that may take up stain for cartilage. Lanyon (pers. comm.) has noted that this feature is widespread in the Tyrannidae. A similar condition is observed in the Coliidae (see Fig. 3). As far as is known, this condition occurs only in these two families. However, detection of this feature requires clearing and application of alcian blue stain (see Part III). Ames (19871) did not clear or stain passerine syringes, so that this character may remain undetected in some passerine taxa. Although associated with internal

cartilages in both cases that it has been observed, the connective tissue is concentrated away from the internal element so it is not obvious that these must necessarily be correlated. As noted above, a hypothesis of colies as the sister group of passerines results in no change in tree length. However, when homology of the medial connective tissues in tyrannids and colies is enforced, tree length increase to 42, providing a strong counter argument.

Fused bronchi

The normal condition in birds (and reptiles) is for the bronchi to diverge after bifurcation from the trachea. Here, an alternate condition, in which the bronchi are fused medially for some distance after bifurcation, has been described for the first time (see Part III). It is reported in two conditions occurring in three taxa.

In the Trochilidae, the bronchi are fused over a long extent, 30-40 rings. In parrots and colies, the bronchi are fused over a much shorter length (3-4 bronchial rings). In all three taxa, fusion apparently takes place by a connection along the internal tympaniform membranes, although the fused bronchi of trochilids are also enclosed in a connective tissue sheath.

Monophyly of the Trochilidae and Coliiformes has been discussed, and shows a tree length decrease of one step over the phylogeny suggested by DNA-DNA hybridization.

Neither movement of the parrots to the hummingbird clade, or movement of the hummingbirds to the parrot lineage causes any change in tree length. As noted, the configuration of this character is different between hummingbirds and colies or parrots. Fusion takes place over a longer extent of the bronchi. This condition (and loss of M. sternotrachealis) may result from the unique position of the hummingbird syrinx in the neck region.

Monophyly of the parrots and colies has also been discussed (see Fig. 11). Monophyly of these taxa results in a reduction of tree length by 4 steps from the phylogeny suggested by DNA-DNA hybridization. The configuration of the fused bronchi is closely similar between these taxa, and provides relatively strong evidence of sister-taxa relationship. This corroborates suggestions by Berman and Raikow (1982).

Reduced tracheal and syringeal ossification

The ubiquitous condition within birds is for the trachea and syrinx to be ossified, and the bronchial elements to be cartilaginous, although there is variability as to which particular intermediate elements are in which condition. It is very unusual for the entire trachea to be cartilaginous. In Part III, this condition has been described for swifts, crested swifts, and hummingbirds. It is also observed in Galbulidae, Bucconidae, Todidae,

Caprimulgidae, and Aegothelidae (see Fig. 12). These taxa are generally similar in possessing very small syringes. However, some caprimulgid syringes which display reduced ossification are relatively large. Conversely, very small syringes in other taxa do not display reduced ossification. For example, this condition has not been reported for syringes of adult passerines (Lanyon, pers. comm.) although many of those are as small or smaller than some of the reduced syringes reported here. Lanyon has noted this configuration in syringes of immature passerines, suggesting that the presence of this character in adults of some taxa may result from heterochrony.

It is possible that the condition results from an interplay between size and air flow requirements of the specific song pattern. However, because it does not appear to be in direct correlation with size, some phylogenetic component is inferred. As displayed in Figure 12, reduced ossification serves as a synapomorphy for Galbulidae and Bucconidae. Although the relationship of these families to other birds, primarily to Piciformes (Simpson and Cracraft 1981, Swierczewski and Raikow 1981, Raikow and Cracraft 1983) or Coraciiformes (Olson 1983, Burton 1984), forms an important current debate, the sister-taxa status of these families is accepted.

Reduced ossification may also be synapomorphic for a clade containing owls, swifts, crested swifts,

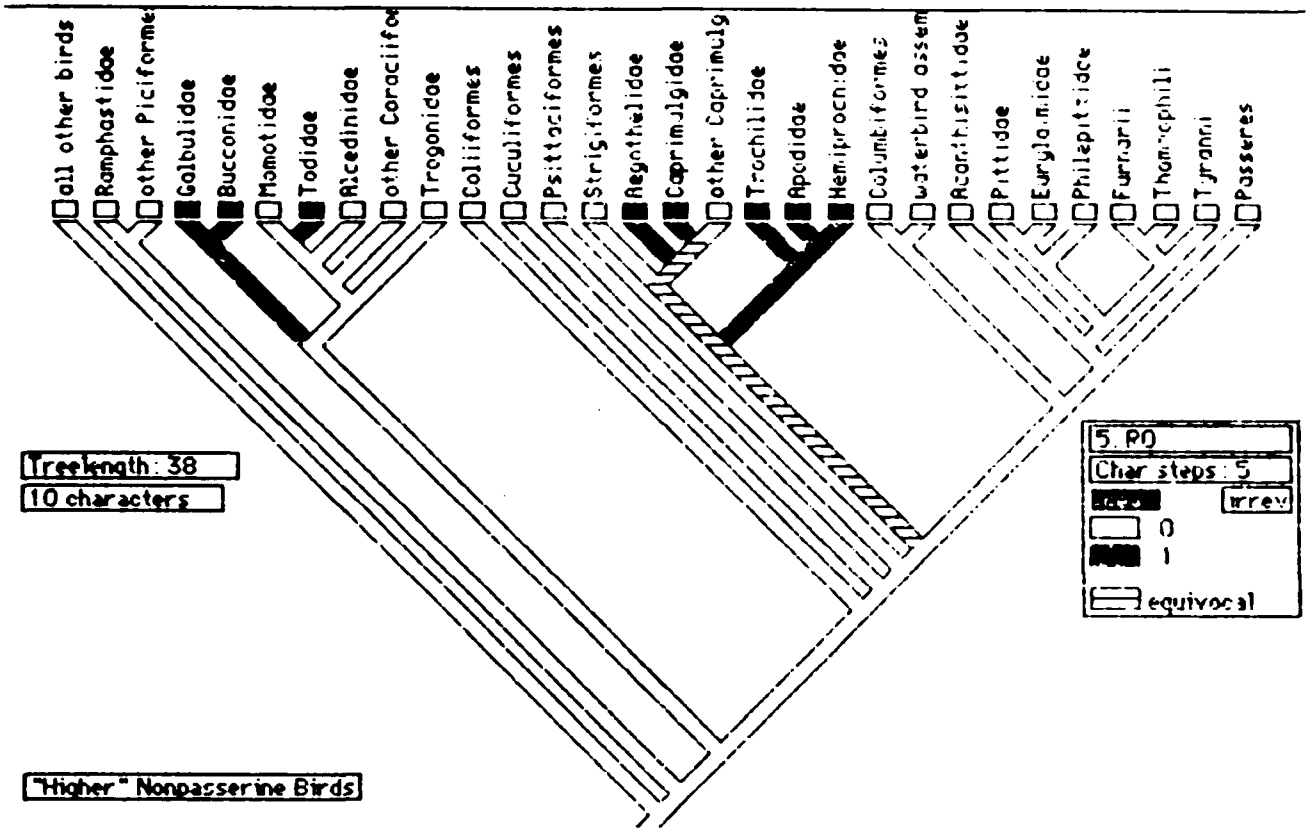

Figure 12. The taxonmic distribution of reduced tracheal and syringeal ossification.

hummingbirds, and Caprimulgiformes, with loss of reduced ossification in owls and in a lineage including Nyctiibidae, Steatornithidae, and Podargidae. Conversely, given the DNA-based tree topology, reduced ossification may have had three independent derivations within this clade (see Fig. 12). However, other topologies may be preferred. For example, a tree with a clade including Caprimulgidae, Aegothelidae, Trochilidae, Apodidae, and Hemiprocnidae shows a reduction in tree length by four steps, and a reduction in character length by two steps. This hypothesis contradicts an assumption of monophly of the Caprimulgiformes, but caprimulgiform monophyly has not yet been precisely supported.

Pessulus

The presence of a full or partial pessulus is somewhat variable within taxa (pers. obs., Ames 1971). Nevertheless, its presence or absence does appear to be characteristic for some groups. Here, based on extensive comparative examination (see Appendix), I follow Ames (1971) in assuming presence as the primitive condition for "higher" birds and the passerines. It has been lost in the Trogonidae, Psittaciformes, Coliiformes, "the Furnarioidea, most of the Pittidae, many of the Tyrannidae, and the oscine family Alaudidae" Ames (1971:144). Its loss may

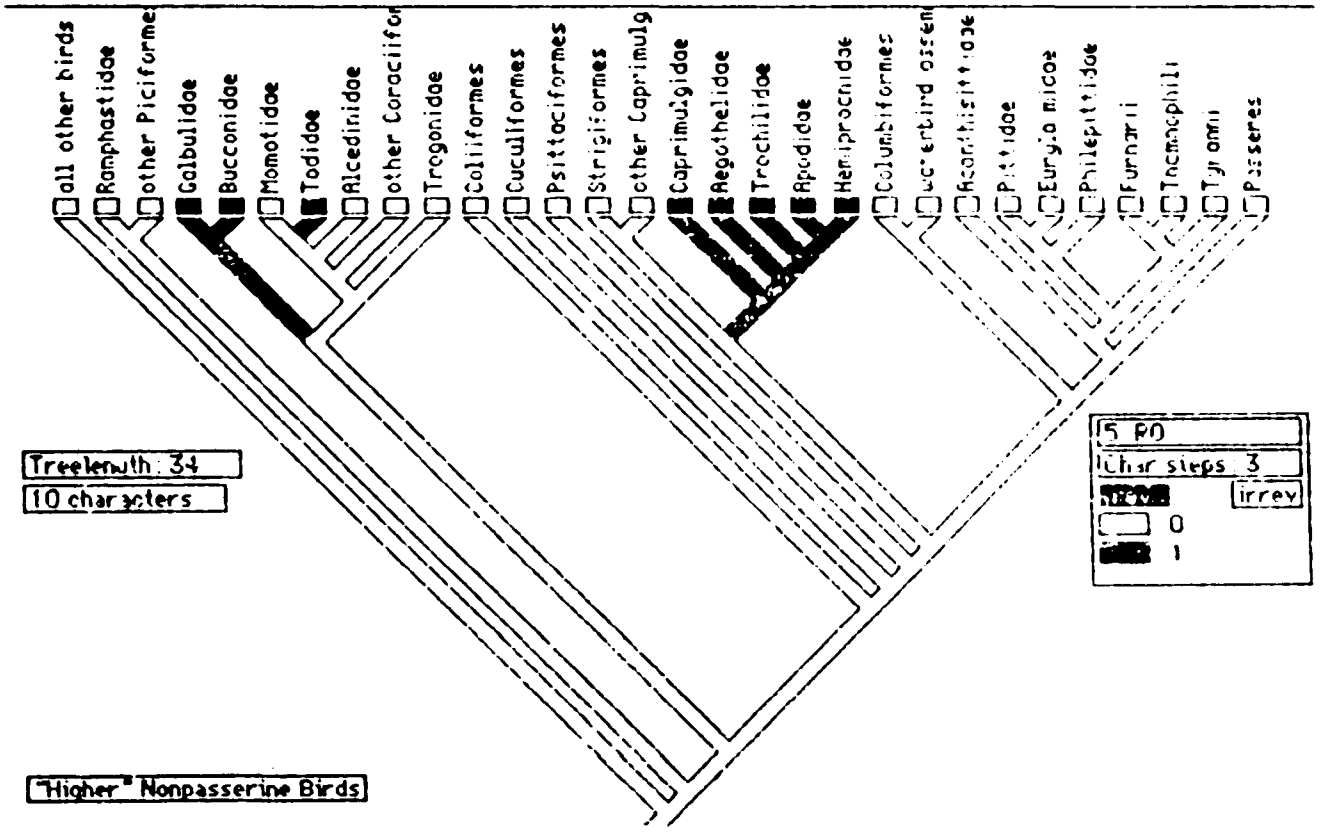

Figure 13. The monophyly of nightjars, owlet-nightjars, hummingbirds, swifts, and crested swifts.

be homologous for the colies and parrots (see above) and for the Furnarii (=Furnarioidea above).

Tapered Tracheal Rings

The tracheal rings of most birds are closely aligned with one another, although many, perhaps most taxa possess notches into the caudal and cephal edges of the rings along the dorsal and ventral surfaces. An alternate condition, in which the tracheal rings are gradually tapered dorsally and ventrally, has a much more restricted distribution. In Part III, I have reported it in Trochilidae (see figure 5). It is also found in Caprimulgidae, Columbiformes (pers. obs., Warner 1972b), some Galliformes, and some Anseriformes. The most parsimonious interpretation of this character is as three independent derivations within higher birds. Alternate topologies or enforced assumptions of homology result in increased total tree length and number of character steps.

D. Discussion and Conclusions

Few morphological features have been described broadly for birds in a manner that allows rigorous analysis. Three factors may have contributed to this.

First, morphological studies are time consuming, discouraging broad comparison. For example, Homberger (1986) has recently devoted 232 pages to the lingual

apparatus of 14 specimens of a single species "as the basis for future comparative studies." Even recent cladistic studies do not generally define the distribution of characters outside the taxon being studied. The fact is that despite a century or more of study, it is difficult to determine the distribution of a character without conducting a study oneself.

Second, many early studies did not describe individual characters as much as assign them to types. This was true for the syrinx, the palate, intestinal convolutions, thigh muscles, and other features. This approach has inhibited subsequent analysis. For example, although the avian palate has received as much attention as any avian character, this has been virtually entirely in the context of discussions of palate types. I do not include palate type in discussions above because the anatomy of palate components awaits description and broad comparison.

Third, higher order taxonomy, and avian anatomy in general, have received little attention in this century. Developing behavioral and ecological sciences attracted many students. Within systematics, attention was focused primarily on questions relating to geographic variation and species and subspecies limits. More recently, with the application of more rigorous approaches to systematics (e.g., cladistics), there has been renewed interest in the

higher level phylogeny of birds, and consequently in avian anatomy.

Although the syrinx of nonpasserine birds has received virtually no systematic comment in this century, it does vary morphologically across taxa (see Part III). Here, I have described and assembled syringeal characters which potentially bear on the phylogeny of "higher" birds, including Passeriformes. I have compared these syringeal characters to hypotheses of relationship derived from other sources: non-syringeal morphology and DNA-DNA hybridization studies. I list specific conclusions below. These await further testing as new characters become available.

1. Parsimony, structural dissimilarity, and evidence from DNA-DNA hybridization studies argue against a homology between the internal elements of passerines and those occurring in colies, hummingbirds, motmots, or ramphastids.

2. Topologies with hummingbirds as the sister-group of swifts and crested swifts and of the colies are equally parsimonious.

3. A sister-group relationship between parrots and colies is four steps more parsimonious than the topology indicated by DNA studies.

4. A hypothesis in which parrots and colies are the sister group to passeriformes, and in which homology of intrinsic muscles is enforced, is equally parsimonious as the traditional assumption of independent derivation of intrinsic muscles.

5. A syringeal character, reduced tracheal and syringeal ossification, is synapomorphous for the Bucconidae and Galbulidae.

6. A clade consisting of Caprimulgidae, Aegothelidae, Trochilidae, Apodidae, and Hemiprocnidae shows higher parsimony than alternatives, indicating need for a precise examination of caprimulgiform monophyly.

V. Monophyly of the Tyrannidae: a Response

McKitrick (1985) reviewed nine morphological characters historically associated with the avian family Tyrannidae, assessing their validity as indicators of monophyly. Following criteria of Raikow (1982), she judged six of these to be simply invalid. The remaining three characters, though valid, defined clades somewhat different than the Tyrannidae as traditionally defined (e.g., Traylor 1979). These characters were not entirely congruent, but none of the resulting most-parsimonious trees agreed with a phylogeny produced independently from DNA-DNA hybridization data (Sibley and Ahlquist 1985b). Here, McKitrick broached a topic of broad interest, asking how one can choose among phylogenies of such different derivations?

Phylogenies of birds produced by Sibley and Ahlquist from DNA-DNA hybridization have included some startling results (see Sibley and Ahlquist 1985b), but few of these have yet been tested by morphological systematists. As one of the first explicit comparisons, the conflicting phylogenies of the Tyrannidae presented by McKitrick appear as a test case of the relative values of morphology and DNA-DNA hybridization in phylogenetic inference. Whereas Sibley and Ahlquist state that morphology is functional and possessing "many cases of convergence ... so subtle that

they defy solution by anatomical comparison" (1986b:82), McKitrick's recommendations include review of both morphological and biochemical assumptions and procedures. Because of the importance of the conflict, I respond below to McKitrick's suggestions, and examine in somewhat greater detail the assumptions of the morphological and biochemical based phylogenies presented by her.

Morphology

McKitrick made three recommendations towards the further assessment of morphology in these groups. First, she recommended that increased knowledge of function might aid in the assessment of the frequency of convergence. As an example, she noted (p. 42) that theoretically "the derived condition would appear to be an easy one to evolve." In fact, she notes, it appears to be rare. This difference between functional understanding and actual distribution would appear to be a counterargument to the importance of functional examination to phylogenetic inference.

Her second and third suggestions, further examination of tyrannid internal cartilages, and search for new characters cannot be faulted.

Still, another, and traditional, option exists when hypothesized phylogenies are in conflict - that is to reexamine the original characters. McKitrick found that

three traditional morphological characters were valid at approximately the level of the Tyrannidae. These were: presence of internal cartilages in the syrinx; presence of M. obliquus ventralis on the syrinx; enlarged femoral artery. I discuss these individually, below.

Internal cartilages--McKitrick defines "internal cartilages" as "cartilaginous plates of various shapes located within the internal tympaniform membranes of the syrinx." She indicates their presence in all tyrannids sensu Traylor (1979) and "several species in the families Cotingidae, Pipridae, Oxyruncidae, Philepittidae, and Acanthisittidae," citing Ames (1971) and Lanyon (pers. comm. to McKitrick). Using the oscines, which lack internal cartilages, as an outgroup, McKitrick concludes that the possession of internal cartilages is "clearly derived" within suboscines, with one or two independent origins within the Tyranni.

In Part III, I have described internal elements in several nonpasserine taxa including some, e.g. Coliiformes and Trochilidae, which have been considered close passerine relatives (see Sibley and Ahlquist 1972). If one of these taxa is the sister-group to passerines, than use of it as an outgroup might alter conclusions about the derivation of internal elements.

An assumption of independent derivation of syringeal

elements is shown in Figure 14. This indicates 7 independent derivations of internal syringeal elements in birds, three of them in the Passeriformes (as in McKitrick 1985). Figure 15 assumes a sister relationship between Coliiformes and Passeriformes, with the presence of internal syringeal elements as primitive for Passeriformes. This shows an increase of two steps in total tree length and in the character consistency index. Clearly, McKitrick's scenario is preferred on the basis of parsimony. Differences in structure of the internal elements of Tyrannidae and of Coliidae or Trochilidae, as noted in Parts III and IV, also argue against homology at this level.

M. obliquus ventralis--McKitrick reports an intrinsic muscle, M. obliquus ventralis, as present in all Tyrannidae examined by Ames (1971) except for 12 or so species. Outside of the Tyrannidae, she also reports it in Oxyruncus, Iodopleura, and possibly in Ilicura. Her source for this distribution is Ames (1971), although Ames never specifically compiled a list of species including M. obliquus ventralis. He does specifically name the muscle for some species, but for others, including cotingids and piprids, he leaves muscles unnamed. The homology of these muscles with M. obliquus ventralis is unknown. For example, for Schiffornis, Ames notes that "a short, broad

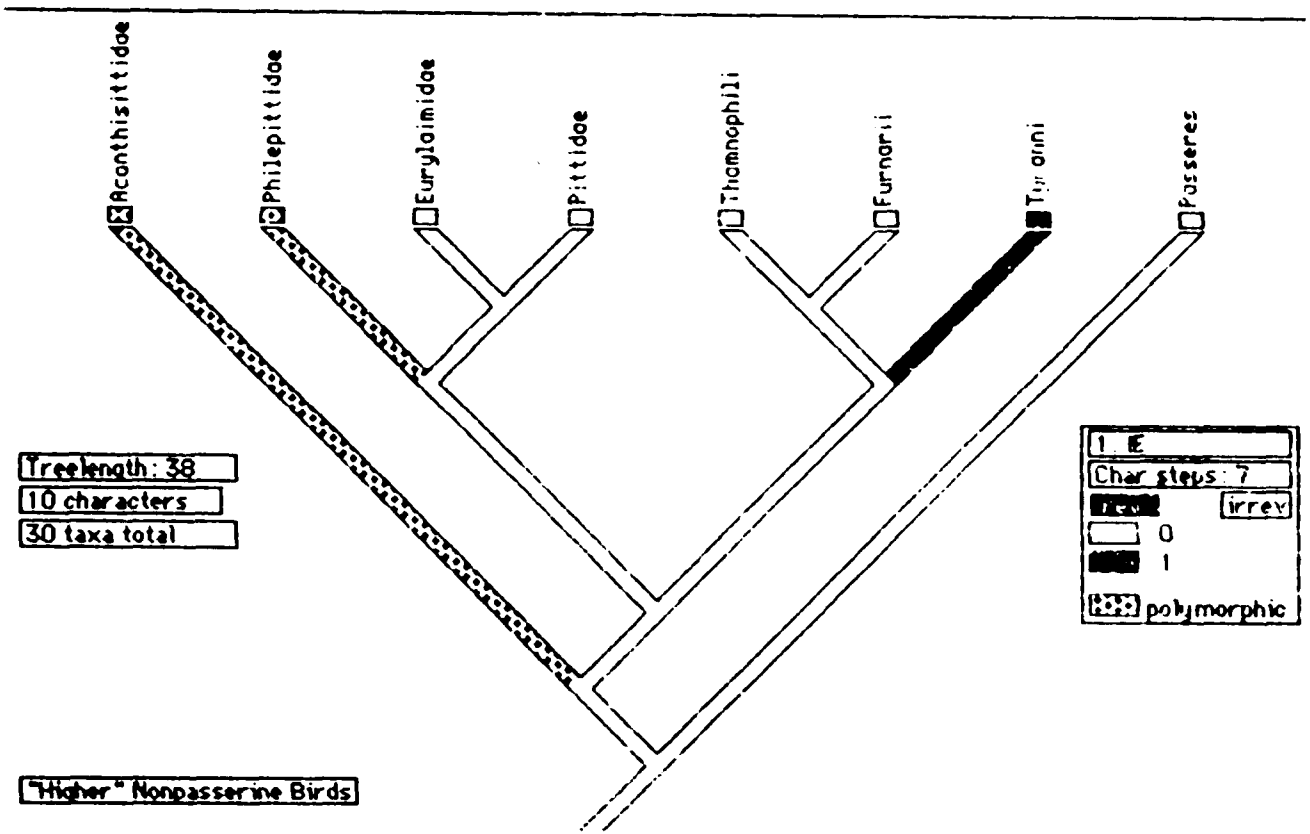

Figure 14. The distribution of internal syringeal elements in passerines: absence of internal elements as primitive.

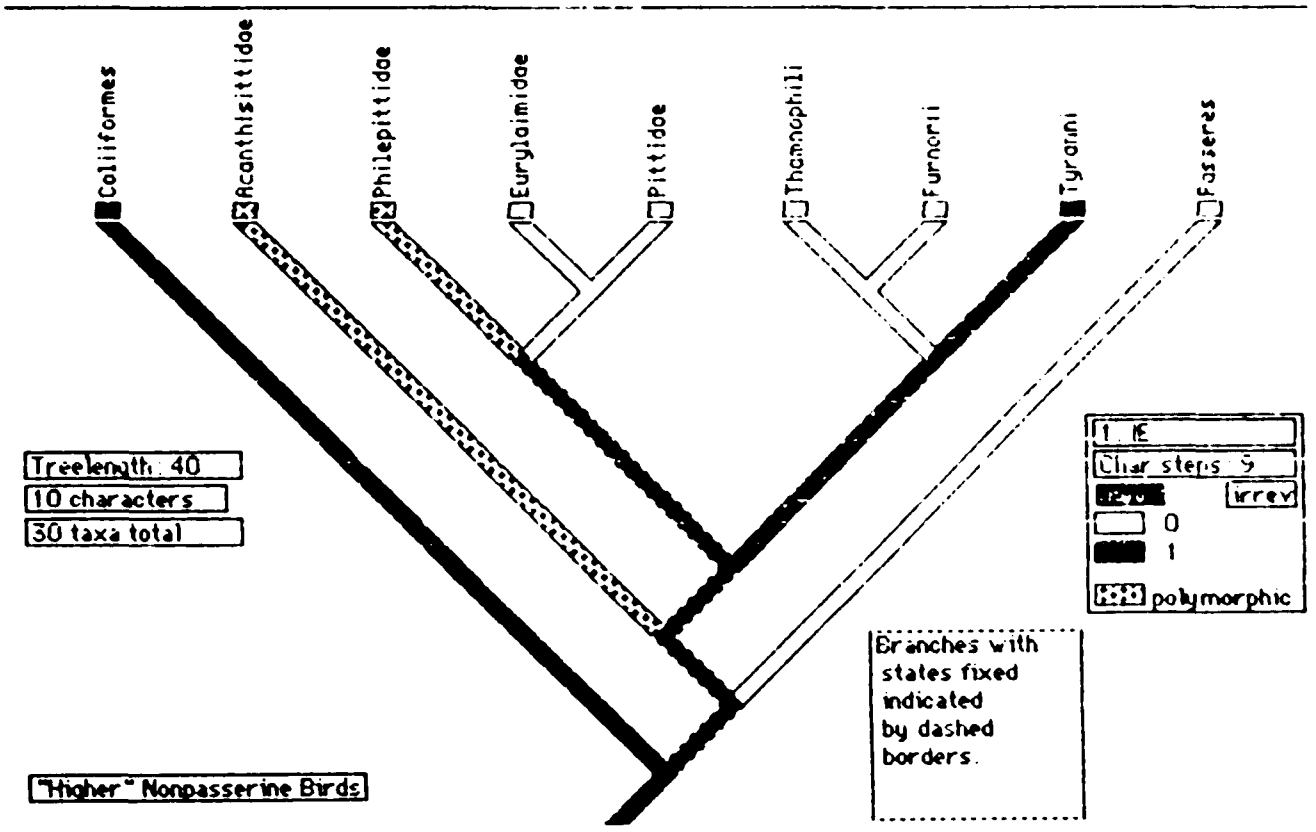

Figure 15. The distribution of internal syringeal elements in passerines: presence of internal elements fixed as primitive.

intrinsic muscle originates immediately posterior to the insertion of M. tracheolateralis and extends posteriodorsad to insert by a short tendon to the subterminal dorsal quarter of B-1." This description is not unlike that of muscles that Ames specifically names M. obliquus ventralis. McKitrick puts Schiffornis in a clade with two other taxa that she indicates as lacking M. obliquus ventralis: Pachyramphus and Tityra. Ames does specifically mention (p.40) M. obliquus ventralis for Pachyramphus. Tityra does not not have intrinsic muscles according to Ames. About Piprites, Ames states (p. 157) that the musculature differs from that of smaller tyrannids only by being narrower.

It appears that current knowledge of the taxonomic distribution of M. obliquus ventralis remains too poorly known to allow robust application to phylogenetic inference.

Femoral artery--Mckitrick's third character is the replacement of the ischiac artery by the femoral artery as the main blood supply to the thigh. As a source, she cites Garrod (1876) and Midtgard (1982). Garrod (1876), unfortunately, does not state precisely which non-suboscine species he has examined, nor does he note how many of each he has examined. Midtgard examined single specimens of Chiroxiphia pareola and a Pipra species within the

suboscines, and single specimens of a pigeon, parrot, owl, and kingfisher among "higher" nonpasserines. Although these two examinations may be perfectly valid, the distribution and variability of this character may also be insufficiently known to allow robust application to phylogenetic inference.

Biochemistry

In regard to the DNA-DNA hybridization based phylogeny, McKitrick recommended "a critical examination of the methods and, especially, the assumptions involved in DNA-DNA hybridization studies. For example, it would be helpful to know how the outcome would be changed if more, labelled taxa were used." An examination of the techniques and assumptions of DNA-DNA hybridization are certainly important, and some critical reviews are currently in press (Cracraft, in press; Houde, in press). These suggest that one point of frequent weakness in current DNA studies is the low number of labelled taxa employed, and the few data reported. In this particular case, those criticisms do not apply. The taxa compared by McKitrick have mostly been labelled in the DNA-DNA study, and the data are available in that paper such that a nearly complete matrix can be reconstructed. This makes this case one of the best DNA-DNA data sets that has been published.

Conclusions

McKitrick posed the important question: "how can one choose among phylogenies?" Here the choice is simple. In this case, morphological studies have not been able to yield robust data. In comparison, the DNA-DNA phylogeny is derived from one of the most robust studies of its type yet published, at least in regard to the number of taxa labelled and the availability of the data.

The real conclusions here concern the failure of morphologists over the last century to clearly articulate distributions of particular morphological features, and to employ them in constructing phylogenies. This is not to suggest that morphology is not useful for reconstructing phylogeny, indeed some recent studies have demonstrated that it is (e.g., Lanyon 1985, 1986; Maurer and Raikow 1981; Swierczewski and Raikow 1981). The conclusion here is simply that morphologists have not generally tested morphology towards this end.

Appendix: List of Non-passerine Syringes Examined

Following is a list of nonpasserine syringes examined during the course of this study. Over 600 specimens, representing 360 species, 57 families, and 22 orders are included. Numbers in parentheses indicate uncatalogued specimens from the American Museum of Natural History unless otherwise specified. Numbers in parentheses after family names indicate: the number of specimens for that family; the number of genera represented and the total number of genera in the family; the number of species represented and the total number of species in the family. Nomenclature follows Moroney, Bock, and Farrand (1975).

Struthioniformes

Struthionidae (1:1/1 sp.)
- *Struthio camelus*: (1).

Sphenisciformes

Spheniscidae (3:2/6 g.:2/18 spp.)
- *Eudyptes chrysolophus*: (1).
- *Spheniscus mendiculus*: (2).

Gaviiformes

Gaviidae (3:1/1 g.:2/5 sp.)
- *Gavia immer*: PFC #444 + (1).
- *Gavia stellata*: AMNH 8484.

Podicipediformes

Podicipedidae (1:1/5 g.:1/20 sp.)
- *Podiceps auritus*: AMNH 8428.

Procellariiformes

Procellariidae (1:1/12 g.:1/66 sp.)
- *Pterodroma hasitata*: AMNH 8622.

Pelecaniformes

Pelecanidae (1:1/1 g.:1/8 sp.)
- *Pelecanus roseus*: AMNH 8619.

Sulidae (6:2/2 g.:3/9 sp.)
- *Morus bassanus*: AMNH 8429 + (3).
- *Sula dactylatra*: (1).
  - *S. nebouxi*: AMNH 8618.

Phalacrocoracidae (2:2/3 g.:2/33 sp.)
Nannopterum harrisi: AMNH 8617.
Phalacrocorax auritus: (2).

Ciconiiformes

Ardeidae (7:6/16 g.:5/62 sp.)
Ardea herodias: (1).
Ardeola ibis: AMNH 8624.
Butorides striatus: AMNH 8625 + (1).
Egretta cerulea: PFC 427.
Ixobrychus sinensis: AMNH 8621.
Nycticorax nycticorax: AMNH 8432, PFC #437.

Ciconiidae
Ciconia ciconia: (1).
C. nigra: AMNH 6377.
Jabiru mycteria: (1 sk.).

Anseriformes

Anatidae (15:6/43 g.:11/147 sp.)
Aix sponsa: (1).
Anas crecca: (2).
A. platyrhynchos: (2).
Aythya ferina: (1).
A. valisneria: (1).
A. marila: (1).
Bucephala clangula: (1).
B. albeola: (3).
Cygnus atrata: (1).
Mergus merganser: (1).
M. serrator: (1).

Falconiformes

Cathartidae (5:2/5 g.:2/7 sp.)
Cathartes aura: YPM 12563 + (3).
Vultur gryphus: AMNH 8498.

Pandionidae (3:1/1 g.:1/1 sp.)
Pandion haliaetus: AMNH 8488; YPM 12562.

Accipitridae (29:19/67 g.:25/217 spp.)
Accipiter gentilis: (1).
A. novaehollandiae: MVZ 2060.
A. striatus: AMNH 8482, 8686; (2).
A. virgatus: AMNH 8030.
Butastur indicus: AMNH 8497.
Buteo albicaudatus: AMNH 8683.
B. jamaicensis: PFC 439.
B. platypterus: AMNH 8687 + (1).
Circus aeruginosus: AMNH 8626.

C. macrourus: YPM 1348.
Elanoides forficatus: YPM 7750.
Elanus leucurus: KU 56804.
Gampsonyx swainsoni: AMNH 8529.
Haliastur indus: AMNH 8496.
Haliaeetus leucocephalus: KU 46189.
Henicopernis longicauda: YPM 12562.
Ictinia mississippiensis: KU 49239.
Kaupifalco monogrammicus: YPM 5628.
Leucopternis albicollis: AMNH 8492.
Melieroz poliopterus: YPM 5832.
Milvus migrans: YPM 4055.
Neophron percnopterus: YPM 4053.
Rostrhamus sociabilis: YPM 1061.
Spilornis chaela: AMNH 8616.
Torgos tracheliotus: KU 81668.

Sagittariidae (2:1/1 g.: 1/1 sp.)
Sagittarius serpentarius: MVZ 4611; YPM 3721.

Falconidae (18:5/10 g.:11/62 sp.)
Daptrius americanus: AMNH 8667; KU 68951.
D. ater: KU68951.
Falco biarmicus: (1).
F. columbarius: (1).
F. mexicanus: KU 055827.
F. peregrinus: AMNH 8499.
F. rufigularis: KU 041874.
F. sparverius: AMNH 8430, 8413, 8688; + (3).
Microhierax fringillarius: MVZ 2104.
M. erythrogonys: AMNH 8623.
Polihierax insignis: (1).
P. semitorquatus: YPM 5663.

Galliformes

Cracidae (5:2/8 g.:3/44 sp.)
Crax tomentosa: AMNH 8658, 8659.
C. alector (2)
Pipile pipile: (1).

Phasianidae
(Tetraoninae) (9:3/6 g.:3/16 spp.)
Bonasa umbellus: (1).
Tetrao parvirostris: (1).
Lagopus lagopus: (7).

(Odontophorinae) (1:1/10 g.:1/33 spp.)
Rhyncortyx cinctus: LSU 108151.

(Phasianinae) (31:10/63 g.:23/212 spp.)
Arborophila torqueola: (2).
Argusianus argus: (1).

Coturnix delegorguei: (1).
C. coturnix: (1).
Francolinus africanus: USNM (1).
F. ahatensis: FM 107800.
F. capensis: USNM (4).
F. coqui: (1).
F. hartlaubi: (1).
F. levaillantoides: (1).
F. natalensis: (1).
F. sephaena: (1).
F. swainsoni: (1).
Lophura inornata: (1).
L. erythropthalmus: (2).
L. edwardsi: (2).
L. ignita: (1).
Margaroperdix madagarensis: AMNH 8628.
Pavo cristatus: (2).
Polyplectron malacens (1).
Ptilopachus petrosus: (1).
Rollulus rouloul: AMNH 7649.
Tragopan temmincki: (1).
T. satyra (1)
T. caboti (1)

(Numidinae) (12:3/5 g.:4/7 spp.)
Acryllium vulturinum: (1).
Guttera edouardi: (7).
G. pucherani: (1).
Numida meleagris: (2).

Opisthocomidae
Opisthocomus hoazin: AMNH 8302.

Gruiformes

Gruidae
Grus canadensis: (1).

Rallidae (3:3/53 g.:3/142 spp.)
Laterallus exilis: LSU 101655.
Porzana carolina: PFC 420.
Rallus limicola: AMNH 8434.

Charadriiformes

Haematopidae (2: 1/1 g.:1/7 spp.)
Haematopus ostragalus (2).

Scolopacidae (4:1/23 g.:1/86 spp.)
Scolopax minor: (2).
Tryngites subruficollis: MVZ 4708, 4709, 4710, 4711.

Ryhchopidae (2:1/1 g.:1/3 spp.)
Rhynchops niger: (2)

Laridae (2:1/4 g.:1/88 spp.)
Larus delawarensis: (2).
Sterna albifrons: (1).

Columbiformes

Columbidae (2:1/42 g.:1/303 spp.)
Columba livia: AMNH 8431, 8415.

Psittaciformes

Psittacidae (25:10/64 g.:15/268 spp.)
Agapornis fischeri: (3).
A. personata: (2).
A. pullaria: (1).
Amazona aestiva: (1).
A. amazonica: (2).
A. dufresniana: AMNH 8491.
A. farinosa: (1).
Aratinga erythrogenys: (1).
Nannopsittaca panychlora: AMNH 8656, 8657.
Pionites melanocephala: AMNH 8663.
Pionopsitta haematotis: LSU (1).
Poicephalus senegalus: AMNH 8304, 8500.
Psittacula krameri: (2).
Psittacus erithacus: AMNH 8313, 8314, 8315 + (1).
Pyrrhura melanura: AMNH 8664.

Cuculiformes

Cuculidae (7:5/38 g.:5/129 spp.)
Coccyzus americanus: AMNH 8303 + (1).
Dasylophus superciliosus: AMNH 8495.
Geococcyx californiana: (1).
Neomorphus geoffroyi: LSU 108158, 108159.
Piaya cayana: LSU 108157.

Musophagidae (1:1/5 g.:1/18 spp.)
Tauraco hartlaubi: AMNH 7336.

Strigiformes

Tytonidae (9:2/2 g.:3/11 spp.)
Tyto alba: AMNH 7472, 8680, 8682, + (3).
T. tenebricosa: AMNH 7495.
Phodilus badius: AMNH 6419, USNM 509512.

Strigidae (115:20/28 g.:63/125 spp.)
Aegolius acadicus: AMNH 8489, 8837, 8838.
A. funereus: BM(1).

A. ridgwayi: MVZ 4133.
Asio otus: AMNH 8312, USNM 102256 + (2).
A. flammeus: AMNH 8684.
A. madagascariensis: USNM 432541.
A. stygius: AMNH 7466.
Athene noctua: USNM 503831, 511653.
A. brama: YPM 10109.
Bubo africanus: BM A/1977.18.13
B. bubo: AMNH 7450; YPM 6182.
B. lacteus: BM(1).
B. poensis: YPM 11582.
B. virginianus: AMNH 7451; YPM 11545, 11605; + (11).
B. shelleyi: AMNH 8414.
Ciccaba albitarsus: LSU 107593.
C. huhula: (1); MVZ 4644.
C. nigrolineata: USNM 506355.
C. virgata: AMNH 7408; USNM 507801; KU 68906.
C. woodfordii: YPM 11584; 11585.
Glaucidium brasilianum: AMNH 3499 + (4).
G. brodiei: USNM 509500.
G. cuculoides: USNM 509502; YPM 10106.
G. gnoma: AMNH 7407.
G. jardinii: LSU 79511.
G. passerinum: BM 99.11.20.1
G. perlatum: BM 1928.2.3.9.
Ketupa ketupa: BM A1981.14.1
Lophostrix cristata: LSU 72949.
Micrathene whitneyi: USNM 505652, 506216.
Ninox connvens: AMNH 7442.
N. jacquinoti: AMNH 7422.
N. novaezeelandia: BM A/1974.10.6.
N. odiosa: AMNH 7423, 7424.
N. philippensis: AMNH 8490, USNM 509092.
N. scutulata: AMNH 8615.
Nyctea scandiaca: USNM 508093; YPM 1090; AMNH 8836.
Otus asio: AMNH 8310, 8671; YPM 8755, 12513 + (6).
O. bakkomoena: YPM 10110.
O. choliba: LSU 64764.
O. cooperi: KU 45708; MVZ 3603.
O. flammeolus: MVZ 2306.
O. guatemalae: AMNH 7437; KU 68903.
O. leucotis: KU 67472.
O. nudipes: USNM 50880; AMNH 7438.
O. rufescens: BM A1974.5.2
O. scops: USNM 540339, 539064.
O. senegalensis: BM1938.11.18.1.
O. spilocephalus: USNM 509497.
O. trichopsis: YPM 10775.
O. watsoni: AMNH 8685.
Pseudoscops grammicus: USNM 19964.
Pulsatrix perspicillata: AMNH 2789.
Rhinoptynx clamator: LSU 114344.

Sceloglaux albifacies: BM uncat.
Speotyto cunicularia: AMNH 7447, 8679, 8679.
Strix aluco: YPM 8021.
S. leptogrammica: USNM 508602.
S. occidentalis: MVZ 2318.
S. uralensis: BM(1).
S. varia: AMNH 7439, 8681, 8709.
Surnia ulula: YPM 5331.
Speotyto cunicularia: AMNH 8678, 8679.

Caprimulgiformes

Steatornithidae (3:1/1 g.:1/1 sp.)
Steatornis caripensis: AMNH 7677, 8689; YPM (1).

Podargidae (9:2/2 g.:6/13 spp.)
Podargus ocellatus: YPM 8707.
P. papuensis: AMNH 8711, BM A/1975.18.10.
P. strigoides: AMNH 8483, USNM 19361.
Batrachostomus sp.: AMNH 2776.
B. auritus: BM1968.74.21
B. septimus: USNM 321751.
B. stellatus: BM 1968.74.24

Nyctibiidae (5:1/1 g.:3/6 spp.)
Nyctibius grandis: AMNH 8707; YPM 1012.
N. aethereus: MVZ 4646.
N. griseus: KU 68907, 68909.

Aegothelidae (4:1/1 g.:4/8 spp.)
Aegotheles insignis: AMNH 8611.
A. cristatus: YPM 12483.
A. albertsi: YPM 8710.
A. archboldi: YPM 534.

Caprimulgidae (44:14/19 g.:30/77 spp.)
Caprimulgus anthonyi: LSU 75457.
C. carolinensis: YPM (1).
C. cayannensis: (1).
C. europaeus: YPM 4077.
C. indicus: BM1930.7.16.536.
C. inornatus: YPM 5502.
C. macrourus: BM 1926.11.13.3
C. madagascariensis: YPM 4265.
C. natalensis: BM(1).
C. nigrescens: AMNH 8493, 8665, 8666; YPM 1896.
C. ridgwayi: KU 41994, 45796.
C. ruficollis: BM 1961.17.4
Chordeiles acutipennis: AMNH 4361
C. minor: AMNH 8735 + (2).
C. rupestris: LSU 101166.
Eurostopodus guttatus: YPM 10249.

E. macrotus: AMNH 8612, USNM 509845.
Hydropsilis brasiliana: USNM 227557, 227744.
H. climacocerca: KU 68959, 73339.
Lurocalis semitorquatus: USNM 504294.
Nyctidromus albicollis: AMNH 8146; KU 68915, 68917.
Nyctiphrynus ocellatus: LSU 71534.
Nyctiprogne leucopyga: AMNH 2274.
Otophanes mcleodii: KU 45797.
Phalaenoptilus nuttallii: USNM 18668; KU 38778, 38833.
Podager nacunda: KU 73377.
Scotornis fossii: YPM 7594.
S. climacurus: USNM 506030, 505075.
Semeiophorus vexillarius: BM A/1975.14.16, AMNH 8710
Uropsalis segmentata: USNM 512012.

Apodiformes

Apodidae(4:2/18 g.:2/83 spp.)
Aeronautes saxatilis: AMNH 8613, 8614.
Collocalia spodiopygia: (2).

Hemiprocnidae (1:1/1 g.:1/4 spp.)
Hemiprocne coronata: AMNH 4711.

Trochilidae (7:6/116 g.:7/341 spp.)
Archilocus colubris: AMNH 8433.
Campylopterus duidae: (1).
C. largipennis: (1).
Coeligena violifer: LSU (1).
Hylocharis cyanus: AMNH 8072.
Phaethornis ruber: (1).
Thalurania furcata: (1).

Coliiformes

Coliidae (3:1/1 g.:2/6 spp.)
Colius macrourus - AMNH 8480, 8481.
C. striatus - AMNH 4255.

Trogoniformes

Trogonidae (10:4/8 g.:7/37 spp.)
Harpactes erythrocephalus - AMNH 8292, 8295
Heterotrogon vittatus - AMNH 8418
Pharomachrus pavoninus - AMNH 84211
P. moccinus - FM 106449, 288082.
Trogon melanurus - AMNH 8296
T. rufus - LSU 108223
T. viridis: AMNH 8632, 8662.

Coraciiformes

Alcedinidae (21:10/14 g.:14/91 spp.)
(Cerylinae)
Ceryle alcyon: AMNH 4669 + (3).
C. torquata: AMNH 8660.
Chloroceryle americana: AMNH 7590.
C. aenea: LSU 108225.

(Alcedinidae)
Alcedo leucogaster: FM 107851, 107988.
A. cristata: AMNH 7585, 7586.
A. atthis: FM 106680, 289127.
Ispidina picta: AMNH 8288.
Ceyx lepidus: AMNH 4046.
Dacelo gaudichaud: AMNH 7602.
Clytoceyx rex: AMNH 7591.
Melidora macrorhina: AMNH 8417.
Halcyon chloris: AMNH 8290.

Todidae (2:1/1 g.:1/5 spp.)
Todus todus: AMNH 8300, 8301.

Momotidae (9:3/6 g.:3/9 spp.)
Eumomota superciliosa: AMNH 8293, 8294
Momotus momota: LSU 101855, FM 106739, AMNH 8677, 8637, 8638, + (1).
Barypthengus ruficapillus: FM 291609

Meropidae (2:1/3 g.:1/24 spp.)
Merops ornatus: AMNH 7576, 7578.

Coraciidae (3:2/2 g.:2/11 spp.)
Coracias benghalensis: AMNH 8297.
Eurystomus glaucurus: AMNH 2206, 2207.

Brachypteraciidae (3:3/3 g.:3/5 spp.)
Brachypteracias leptosomus: AMNH 8419
Atelornis pittoides: AMNH 8437
Uratelornis chimerae: AMNH 8424

Leptosomidae (2:1/1 g.:1/1 sp.)
Leptosomus discolor: AMNH 2208, 2209.

Upupidae (3:1/1 g.:1/1 sp.)
Upupa epops: AMNH (2); FM 107539.

Phoeniculidae (7:2/2 g./3/8 spp.)
Phoeniculus purpureus: AMNH 8410, 8435; FM 107910, 107913.
P. bollei: AMNH 107911, 107912.
Rhinopomastus cyanomelas: AMNH 8436.

Bucerotidae (6:4/12 g.:6/45 spp.)
Berenicornus comatus: AMNH 8494.
Tockus nasutus: AMNH 8420
T. fasciatus: FM 107799
T. camurus: (1).
Penelopides panini: AMNH 8416

Piciformes

Galbulidae (6:3/5 g.:6/17 spp.):
Brachygalba lugubris: AMNH 8676 + (1).
Galbula galbula: AMNH 7687.
G. albirostris: AMNH 8633.
G. leucogaster: AMNH 8073.
Jacamerops aurea: AMNH 8634.

Bucconidae (21:6/7 g.:10/32 spp.;Neotropical)
Bucco macrodactylus: AMNH 8636; FM 290334.
B. tamatia: AMNH 8075
B. capensis: (2).
Chelidoptera tenebrosa: AMNH 8074; LSU 101290, 101864
Malacoptila panamensis: AMNH 8279, 8438, 8439.
Monasa morphoeus: AMNH 8423, 8669.
M. atra: AMNH 8630, 8631, 8668, + (1).
Nonnula ruficapilla: FM 290336
N. rubecula: AMNH 8629.
Nystalus macrourus: AMNH 8440; FM 288378

Capitonidae (23:9/13 g.:13/81 spp.; Neotropical, Ethiopian, Oriental):
Capito maculicoronatus: LSU 108765, LSU 108243.
C. niger: AMNH 8639, 8640.
Eubucco bourcierii: LSU 108246, LSU 108766.
E. versicolor: FM 291612.
Gymnobucco bonapartei: AMNH 8423, 8426.
Lybius bidentatus (2).
L. dubius: (1).
L. guifsobalito: AMNH 5067, 5068.
Megalaima haemacephala: AMNH 8298, 8299.
Pogoniulus scolopaceus: FM 107881, 107882, 107883.
Psilopogon pyrolophus: AMNH 8427.
Semnornis frantzii: MVZ 4315, + (1).
Trachyphonus purpuratus: FM 97232, 97234, 97238.

Ramphastidae (12:5/6 g.:9/33 sp.; Neotropical)
Andigena cucullata: LSU 101870.
Aulocorhynchus derbianus: AMNH 8670.
Pteroglossis aracari: AMNH 12824, 12825.
P. castanotis: LSU(1).
P. flavirostris: AMNH 8672, 8673, 8674.
Ramphastos vitellinus: AMNH 8485.
R. cuvieri: AMNH 8670.
Selenidera spectabilis: LSU 108251, 108768 + (1).
S. culik: AMNH 8487.

Indicatoridae (4:3/4 g.:3/16 spp.; Ethiopian, Oriental):
Indicator maculatus: AMNH 5355, 5358.
Melichneutes robustus: AMNH 5342.
Prodotiscus insignis: AMNH 4182.

Picidae (20:10/28 g.:14/204 spp.):
Campethera cailliautti: AMNH 5390.
Campephilus melanoleucus: (1).
C. rubricollis: (1).
Celeus elegans: FM 104777; + (1).
C. flavescens: AMNH 5049.
C. grammicus: (1).
Chrysocolaptes lucidus: FM 107585.
Colaptes auratus: AMNH 8306, 8411 + (1).
Picoides pubescens: AMNH 8205, 8308 + (1).
Piculus leucolaemus: LSU 108256.
P. flavigula: (1).
Picumnus cirrhatus: AMNH 3504, 3505.
Sphyrapicus varius: (1)
Veniliornis passerinus: AMNH 2278, 2279.

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described by Levine (1982), moving through three stages of optimism, confusion and despair. Concomitant to this are doubts about self-identity, decreased feelings of self-esteem, depression and demoralization. These are all characteristics that encourage disengagement, and the drifting behaviors that make youth high risk for homelessness.

Skill development for independent living cannot be left to chance. These programs should be planned as one aspect of services along a continuum of foster care services. Programs for independent living should provide a range of services that should include clinical "soft", services that address the psychological concerns of the group along with "hard" services that would teach job and vocational skills. It is of importance that in spite of the fact that race continues to be a major factor influencing opportunity in this country for minority group members, the total group of ILSPP adolescents expressed the view that race and color posed no obstacle to individual opportunity.

A final important finding of the study was the process of growth and development of one foster parent who was identified as the "informal consultant" to the project director. The experience of his foster parent does demonstrate the potential for training experienced foster parents to become the primary trainer in agency foster parent training programs, while relying on professional staff for consultation and collaboration.

The status of foster care brings a difference to the life of the child and as well brings a difference to the life of the foster family. Family privacy is to a great degree relinquished to outside authorities who set standards for acceptable levels of care. Additionally, the foster parent's child rearing practices are subject to the review and

critical evaluation of the agency, foster family relationships are stressed and must be re-established with each new placement, attachments are made that may be abruptly severed, and extensive efforts of hard work that are directed towards encouraging the growth of the child may be undone seemingly in one brief moment. These are but some of the occurrences that bring differences to the life of the foster parent. Within this context, the rights of foster parents assume the lowest level of priority when considering those of the birth parent, the child and the agency. Foster parents are better able to identify with the experienced foster parent who is functioning in the role of primary trainer. The identification and empathy that would then exist between the trainer and trainees would facilitate the learning process, decrease resistances and the feelings of distrust that are directed towards the professional trainer who is perceived as having a primary allegiance to the agency.

Recent years have seen foster parents emerging as a viable consumer group. Foster parent organizations or associations now exist at the agency, state and national levels. Given these developments, an upgrading of the position of the foster parent from that of volunteer, altruistic helper to that of salaried para-professional worker may be a timely area of exploration with a group whose role requires a knowledge of psychosocial growth and development, specific techniques of behavior management and the ability to negotiate complex social service delivery systems.

Kadushin (1980, p. 393), in highlighting the findings of several studies that have been concerned with the effects of paying foster parents a fee or salary for services performed discussed some general and

positive effects of such payments as:

(1) agencies were less defensive in their relationships with foster parents and were better able to present the realities of the foster child's difficulties with less fear that the foster parent would reject the placement;

(2) payments made explicit the valuing that the agency gave to the service that was performed by the foster parents; and

(3) foster parents felt a greater sense of identification with the agency, and did perceive staff members as peers and colleagues.

Importantly such payments had the overall effect of improving the quality of care provided. All of these findings have important implications for agency/foster parent relationships in providing under care and follow-up services to the foster adolescent. The goals and objectives of the young adult's plan for independent living may be better achieved when all parties are working cooperatively together within a framework that establishes and defines levels of expectations, performance and accountability.

CHAPTER VI

Summary and Recommendations

During the past two years increasing public attention has been focused on the community adjustment of young adults who have been discharged from the foster care system.

Investigation in this area indicates that these young people have not received the kind of preparation while in care that will enable them to live on their own. Many have been discharged from the foster care system only to enter into other social welfare systems with recent research (Shaffer and Caten, 1984) suggesting a developing trend of movement into the city shelter system. A 1983 study that was undertaken by the Citizen's Committee for Children found that the vast majority of city agencies that provide foster care services do not have in place clearly defined programs that have a goal of preparing adolescents for independent community living.

These occurrences have highlighted the gap in services that exists for this client group. They also emphasize the need to organize foster care services in a continuum of care that extends through post-discharge/ aftercare services.

Social work has traditionally been the professional discipline having the highest degree of visibility in the field of child welfare. Therefore, the transition of the adolescent from foster care status to independent community living and program development that address the difficulties that accompany this transition is an important area of social work practice.

In July, 1985 the State Supreme Court gave legal sanction to the rights of these young people to be provided programs and services that will give them the help that they need to join the mainstream of the society as self-sufficient, contributing citizens. The Court ruled that city officials must supervise adolescents in foster care until they reach the age of twenty-one, and provide them with the kind of training that will prepare them to cope on their own after discharge from the system (New York Times, July 19, 1985).

Court litigation has characterized the process of child welfare policy formulation. Foster care services have long been a target for child advocates and social reformers. The deficits of the system have been acknowledged by key players at every level and by the general public. The services and programs that have evolved have not taken an articulated and integrated direction that has been planned in consideration of the total needs of families. Nor have they taken a purposeful course towards the achievement of clearly defined goals and objectives that embody the expressed societal value that is placed on the importance of family life. The fragmented services that we now see as the heritage of the child welfare system have their roots in an American tradition that supported the development of services under sectarian auspices, an administrative system that structured the delivery of services around the organizational needs of the bureaucracy and a practice orientation in service delivery that did not take into account the effects of environmental influences on individual and family functioning.

Billingsley and Giovannoni (1972), in their analysis of the American Child Welfare System, document that poor, black families have been

especially vulnerable to the effects of services and programs that enact inadequate policies that have been informed by a residual perspective. This perspective has influenced service development in a direction that emphasized the rescue of children from inadequate families, and resulted in large number of black children being unnecessarily placed away from their own homes. Because these children were not viewed as suitable candidates for adoption, nor did their families receive the kind of services that would support reunification, permanent foster care became the reality for a large number of them.

Consequently, we see a disproportionate number of black children in the foster care system. Current statistical reports from Special Services for Children (SSC), the city agency responsible for all dependent children, indicate that 60.3% of children receiving foster care services are black, 48.8% are of adolescent years and 1,700 will be discharged to independent living in FY 1986.

The Adoptions Assistance and Child Welfare Reform Act of 1980 and the New York State Child Welfare Reform Act of 1979 represent major policy reforms that have made considerable inroads in correcting the inadequacies of past foster care practices. The new direction that these policies support have encouraged the development of preventive and reunification services to families. Inquiries into the impact of the legislation document that foster care placement has been averted for many children. There has also been a reduction in the numbers of new children entering into the system. These new thrusts in services, however, have not supported program development for adolescents who will be discharged to independent community living. Barth (1986), notes the paucity of publication of materials in the area of emancipation programs for

adolescents. These findings further establish that pre-discharge programs that provide services that ease the transition to community living are indicated.

Foster parent training programs have been used for some time in child care settings as a means for improving the quality of care for children and families making use of foster care services. These programs have served the important functions of orienting foster parents to the role of fostering, providing ongoing in-service training and advanced training for fostering children who demonstrate special needs.

As early as 1930 when the White House Conference on Children gave recognition to the special needs of dependent and neglected minority children, it was also acknowledged at this Conference that programs for black children should provide opportunities for blacks to participate in their development at the lay and professional levels. Billingsley and Giovannoni (1972), Chestang (1978), and Dodson (1983), are all contemporary writers in the field of child welfare who have continued to advocate for a black perspective in the development and delivery of child welfare services. Such a perspective would capture the nuances of the black experience that effect family functioning and differentiate these families from and connect them to the general population of American families. This perspective would also move service providers away from a model for assessing these families that emphasizes pathology to a focus upon their strengths.

The Independent Life Skills Preparation Project (ILSPP) was developed as a specialized foster parent training program to address the gap in services for the adolescent in foster care. The program design emphasized the need to develop services for families and children from an

ethnic sensitive perspective, and that foster care services are best organized in a continuum of care.

The ILSPP was developed in consideration of the specific needs of the black adolescent approaching discharge from foster care. However, many of the issues of foster care service delivery that are addressed by the project have policy and programmatic implications for the general population of children and families who are consumers of these services.

Program Description

The project design was derived from the basic premise that believes that the family is central to the life of a society and performs the essential function of educating and preparing children for independent living.

Billingsley (1968) in his seminal study of the American black family presented a social systems perspective for understanding the structure and functioning of these families. This perspective acknowledges the impact of the larger social systems of the society on black family life and the adaptive patterns that have emerged that serve positive functions. The conclusion is drawn that the black family is a sustaining, resilient and nurturing social system possessing characteristics that make it particularly well suited to assist black children not only to survive but to achieve in a larger non-supportive environment. Hill (1971) in his study of black families also identifies its positive attributes. He enumerated five strengths that seemed to characterize all black families.

This ecological perspective and conceptualization of the black family as a unit of strength that is particularly well suited to prepare children for independence was incorporated into the work with the foster

family. An assumption that underlay the project design was that the black foster parent has experience in negotiating the demands of two worlds and of parenting own children for successful functioning in these two worlds. This dual perspective has facilitated the development of parenting skills that can be transferred to the fostering experience with the adolescent whose transition to independence is complicated by his foster care and minority group status. The black experience and independent living were consistent themes throughout the implementation process of ILSPP.

The activities and practices of ILSPP were informed by three basic assumptions that acknowledged: (1) the ethnicity of the families making use of services, (2) the strengths of the foster family system, and (3) the need to organize foster care services in a continuum of care that offered a diverse array of services and planned interventions.

The ideological orientation of the project drew upon and integrated several theories and concepts. Major among these were those related to the ecological perspective, adolescent psychosocial growth and development, adult learning theory, role theory, black family life and minority group use of services.

The innovative aspect of ILSPP was in its conceptualization of the placement model. Foster care services have traditionally used a "birth model" for planning placements of children. This model identifies the role of the foster parent as parent substitute. This model acknowledges the psychosocial needs of some age groups of children to form attachments to nurturing parental figures. Conversely, placement in small group settings have been used as the preferred plan of placement for the adolescent since care in such settings does not conflict with his

normative developmental needs to achieve autonomy and separation from parental and family ties. However, in recent years, cost factors and a response to legislation that seeks to support care of the adolescent in the "least restrictive environment", substitute care in individual foster family homes has been increasingly used. Traditional practices have had a continuing influence in these placements. These influences create dilemmas for the adolescent as he seeks resolution of the major tasks of this stage of the life cycle.

The ILSPP conceptualization of the placement model as a contract agreement addressed these dilemmas. The model provided opportunities for the adolescent to enjoy all of the benefits from placement in the foster family home and for meeting his continuing needs for belonging to an intimate group. A contractual agreement, as a model for adolescent placement, focuses on the reciprocity and mutuality that exists between the adolescent, caretaker and placing agency. The role of the foster parent is identified as that of role model and mentor who through a relationship that stresses identification teaches the adolescent mastery and competency in those skills needed for independence.

The project design additionally acknowledged the valuable contribution that the foster parent, who has traditionally been the primary "on the line" providers of foster care services, can make to the foster care program development as a result of their on-the-job experience, life experience and racial identification.

The focus on the strengths of individuals and their coping, adaptive abilities also characterized the work with the adolescent. Robinson and Fields (1983) in their discussion of the invulnerable child, suggest that many children whose lives have been marked by trauma have become stress

resistant, developing compensatory behaviors that allow for a positive adjustment to the demands of their environments.

The foster care literature (Bush and Gordon, 1983) also identifies the positive benefits that are accrued when adolescents are given an opportunity to participate in placement decision making. This involvement supports the adolescents' developmental need to be increasingly involved in decision making about his life. This participation also establishes a mutuality and reciprocity that has a positive effect on placement outcome.

ILSPP represented a collaborative process between the professional project staff, foster parents and adolescents in program development.

Limitations of the project were that the agencies of affiliation were not included in this collaborative process, that the ILSPP participants were not representative of the current under care adolescent population and the limited time frame for the implementation of the program.

Methodology

The ILSPP used a combined descriptive/comparative research design that sought to assess and describe the relative affectiveness of two foster parent training strategies; and the relationship that group composition and instructional format had to the variables of fostering skill and placement stability.

Fostering skill was defined and operationalized into five skill areas of: (1) Self Awareness, (2) Adolescent Growth and Development, (3) Behavior Management/Foster Parent Practice, (4) Assessment and Planning/ Black Family Life Styles and (5) Systems Negotiation/Coping with Burnout. Self-Awareness as defined by the project represented expressive fostering skills. This skill assumed insight into one's own behavior, an ability

to identify the primary parenting style and to differentially apply fostering interventions that were individualized to meet the developmental and emotional needs of the adolescent. Behavior Management/ Foster Parent Practice represented instrumental fostering skills and assumed an ability to identify common problems of adolescence and to apply selective techniques for teaching alternative behaviors. All other skill areas were viewed as having both instrumental and expressive features. Scoring was based on a scale that ranged from 0-85. Skill scores were assigned to categories as follows: High (85-70), Medium (69-50) and Low (49 and below).

Recognizing that there are a number of crucial intervening variables effecting placement outcome, placement stability for the purpose of ISLPP was defined simply as the retention of the adolescent in the foster home for the two month duration of the project.

The data for the study were collected from the Foster Parent Youth, recruitment forms, Foster/Parent Youth Pre-post Questionnaires, participant reactionnaires, participant logs and the video tapes of the training sessions. After all schedules had been completed at the termination of the project the data were tabulated for analysis interpretation and treated statistically.

The total number of ILSPP participants was twenty. The foster parents and adolescents were recruited from the general population receiving foster care services from SSC and its contract agencies. The participants were pre-screened using the major selection criteria of ethnicity, years of fostering experience, discharge plan of the adolescent and agency recommendation. Foster parents who had less than three years fostering experience were not accepted for participation.

Adolescents who were not enrolled in a vocational/educational program or those who had a history of substance abuse, or involvement with the juvenile justice system were excluded from participation. The ILSPP participants represented six private child care agencies and SSC's direct care component.

All of the ILSPP foster parents were black, and with the exception of three all were currently fostering adolescents who would be discharged to independent community living. The foster parents who did not have adolescents in current placement did have previous experience with fostering adolescents. They were selected for participation because of their extensive fostering experience and participation in foster parent training program development.

Of the total number of 13 foster parents, one was a single male. The mean age of the group was 49.5 years. Six were married, 2 were divorced or separated, 2 were widows and 3 had never been married. The mean years of fostering experience was 10.4 years. The mean number of years of affiliation with the same agency was 9.6 years.

All of the foster parents indicated a satisfaction with the role of fostering as assessed by their self-rating of self as a foster parent. Over half of the group identified their occupational status as "foster parent". More than half of the group (9) reported home ownership and did not have biological children living in the home.

The foster parent groups evidenced a similarity on all descriptive variables with the exception of number of years fostering experience and marital and employment status. The mean years of fostering experience for the Communication Group was 12.6 as compared to 8.2 years for the Behavior Management Group. Six of the foster parents in the

Communication Interaction group were unemployed as compared to 2 of those in the Behavior Management Group. Four foster parents in the Communication Interaction Group were married as compared to 2 in the Behavior Management Group. A substantial number of foster parents in the Communication Interaction Group identified their occupational status as "foster parent". It was anticipated that the Communication Interaction group would enjoy instrumental and expressive gains from the increased number of years of fostering experience, opportunities for sharing the fostering experience with a spouse and from being able to devote full attention to a role that was perceived as their major function.

Of the total number of the ILSPP adolescents, 4 were male and 3 were female. The mean age of the group was 18.2 years. All of the adolescents were enrolled in either educational or vocational programs, one was enrolled in a special education program. With the exeption of one all demonstrated a highly stable placement history and had remained in the initial home of placement. The mean number of years in care for the group was 9.2 years, with a range of 2-17 placement years. Only one of the adolescents had experienced more than two placements or placement in an institutional setting.

The ILSPP youth were highly optimistic as they anticipated discharge from the system. All expected to have a job and apartment upon discharge from the system. Two anticipated a need for temporary public assistance. One of the youth anticipating this kind of assistance did have a diagnosed disability. Most of the youth denied having frequent thoughts about discharge but expressed ambivalent feelings as they anticipated discharge from the system. Only one of the youth reported frequent visitation with biological family members, 3 reported infrequent

contact and 3 had no contact with family.

The ILSPP adolescents in total presented a profile of a stable foster care history that was significantly different from that of the under care adolescent population. With the exception of one, all had grown up in the system and one had achieved permanency through adoption. The ILSPP participants represented an "ideal" fostering constellation.

Assignments were made to the two programs as to preference of the foster parents and to ensure that the groups represented diversity in terms of gender of the adolescent and agency affiliation.

The two training programs were implemented concurrently over an eight week period. Sessions were scheduled consecutively and met for two hours. Seven foster parents and seven adolescents completed the Communication Interaction program and six foster parents completed the Behavior Management program.

Each program had a primary trainer, and the project director acted as co-trainer for both programs. The trainers were all black social workers with combined professional experiences in education, child welfare, adolescent services and minority curriculum development. Both of the training programs focused on content and process. However, the emphasis of the Behavior Management was on didactic instruction and the Communication Interaction focused on process. Much of the content of the Communication Interaction program emerged from the interaction of the group.

The format of the programs was informal small group settings that emphasized cooperation and collaboration between the participants and project staff.

A variety of training materials were used. These included role play,

case materials, readings, small group experiences and log assignments.

Findings

During the course of the program, one placement disruption occurred. This was in the Behavior Mangagment group. The youth presented a history of multiple placements with frequent reunifications with the birth parent. As was characteristic of his previous history the youth did return to the foster home after a brief absence.

With this one exception there were no other placement disruptions during the period of implementation and for the four-month period followng the termination of the project. In establishing placement stability as a criterion of program outcome it was acknowledged that there were a number of intervening variables that the project did not factor out that have an association with placement outcome. This finding should be considered within this context and that the ILSPP adolescents' previous history of stability placed them less at risk for placement disruption.

The evaluation of the program did not reveal a statistically significant difference in the post-intervention between and within group mean scores of foster parents. There were, however, observed differences in the effect of the two training strategies that have implication for the planning, design and implementation of independent living skills preparation programs.

Group Composition

Additional benefits are accrued when foster parents and adolescents participate in conjoint training sessions. The qualitative and quantitative measurements of program outcome clearly indicated that the presence of the adolescent had the effect of increasing the

self-awareness of foster parents and their ability to respond to the individuality of the adolescent. The post-intervention performance of the two training groups was grossly similar in all fostering skill areas with the exception of Self-Awareness. The Communication Interaction group demonstrated a far greater improvement in attained Self-Awareness skill score in comparison to the Behavior Management group. The Communication Interaction foster parents verbalized new insights into the behavior and feelings of the adolescents during the process of implementation. When the project terminated there was consensus among the group members that they had improved in their ability to emphathize with the adolescent. This improvement was attributed to the intervention strategy.

This method of group composition also provided opportunities for foster parents and adolescents to work cooperatively in shared problem solving activities related to independence. The ILSPP experience highlighted for both foster parents and adolescents that the process of formulating individual plans must be a planful process that is monitored, goal-directed, realistic and completed with a specific time frame.

This method of training also supported a greater variation in the patterns of within group subgroupings that are formed. The adolescents formed a distinct subgroup that performed support and teaching functions. The feedback and behavior modeling that came from peers had a far greater teaching value than what often is perceived as "lecturing" from the adult caretakers. Subgroups were also formed around gender of the adolescents. This subgrouping enriched content around family planning and social/interpersonal relationships as an aspect of independent living.

Identity consolidation is a crucial and central developmental task of adolescence. Foster care status complicates this process for the adolescent as it is a status that continues to carry a high degree of stigmatization. It seems essential that significant persons in the life of the adolescent demonstrate an ability to acknowledge this difference if they are to effectively assist in this process. The tendency of the total group of ILSPP foster parents was to deny the difference that foster status brings to the life of the adolescent and to treat the child as if he/she were their own.

However, while a sameness to birth children is verbalized, the difference does emerge in interactional patterns. This inconsistency between what is verbalized and what is experienced seems to reinforce the feelings of stigmatization that are experienced by the adolescent.

The presence of the adolescent had the effect of reinforcing an avoidance of this central issue. The Behavior Management foster parents, in absence of the adolescents, demonstrated a greater ability to accept their status of being the second adult figure of importance in the life of the adolescent. This orientation freed these foster parents from the need to compete with birth parents and minimized feelings of personal failure and responsibility for the adolescent's limitations. Such an orientation supported a greater objectivity in the caretaker role, which is central to the ILSPP's conceptualization of the role of the foster parent.

The foster parent has a delegated authority that is subordinate to that of the agency and natural parent. This "as if" quality of the relationship that comes to fore with the denial of the adolescents' foster care status invariably brings the foster parent into conflict with

the policies and regulations of the foster care system. Consequently, more opportunities are available for the adolescent to manipulate key persons in his life.

This "as if" dynamic further encourages a lack of authenticity in relationships that is dysfunctional to the process of identity consolidation and to the development of those social/interpersonal skills that serve positive functions in independence. The Behavior Management program as a training strategy more effectively addressed these issues of adolescent fostering.

A final observation about the effect of group composition and training outcome is that conjoint sessions provided an opportunity to constructively confront the issue of authority, which is central to adolescent fostering. Groups are a natural environment for the adolescent and when training is structured to include group interaction with adult authority figures, the adolescent is provided a support system within which he can appropriately challenge traditional values and authority. Foster parents as well are able to relinquish the need for absolute control, an attribute that is somewhat characteristic of the black foster parent. Conjoint training effectively promoted within group member sensitivity and in the Rogerian tradition seemed to facilitate the personal growth of some group members.

Instructional Format

Clearly discernable differences in learning patterns of the foster parent groups did emerge. Generally, the Communication Interaction group, with an emphasis on communication and interaction, supported affective learnings and facilitated a greater sensitivity between adolescents and foster parents. The experience for this group remained a

highly personal one. The foster parents of the Behavior Management group became more adept at generalizing their personal experiences to the more global issues of child welfare. The Communication Interaction group developed as "practitioners" and the Behavior Management group as "teachers".

The total group of participants were more easily engaged around experiential activities. Therefore, in developing these programs a wealth of opportunities should be provided for the use of role play, small group experiences, case materials and visual aids.

The style of the trainer assumes an enormous importance in training and has a significant impact on the direction of development of the group process, group character and the interactional patterns that emerge within the group. The experience of the Independent Life Skills Project demonstrated that a didactic teaching style of the trainer facilitated the development of cognitive behaviors that were observed in the Behavior Management group and an identification with the teaching role. The expressive, process-oriented style of the trainer in the Communication Interaction Group reinforced behaviors that enabled foster parents to perform more effectively in the practice role of fostering. This suggests that a diversity of training styles and teaching models be incorporated in training to support the most effective achievement of the learning objectives of the training modules.

Central to the educational encounter is the ability of the teacher to enter into the life space of the learner. The ethnicity of the project trainers did facilitate this process. This similarity supported the foster parents' identification with the professional staff that was observed during implementation. The foster parents evidenced a greater

degree of comfort in sharing highly personalized responses to the fostering experience and reactions to services provided by agencies. One foster parent stated that her social workers tended to be young and white. Age and ethnicity were experienced as distancing variables. The observation was made that the workers did not fully "understand the situation of our kids" or that "we (black people) have been doing this (caring for black children) for a long time."

There are a spectrum of teaching models that have difference uses for difference learners, and can be utilized in the development of instructional methods. It has been demonstrated that didactic teaching models support cognitive learnings and expressive non-directive methods support affective learnings and attitudinal changes. This was the experience of ILSPP. The general principles of adult learning theory should be incorporated into the work with foster family groups. This philosophical orientation would support the assumption that adults are best engaged when they are involved in developing the content of what is to be learned and when the material has meaning to his current life experiences and allow for its practical applications.

Lee (1979) in a project that used the small group design as a modality for work with new foster parents found that neither the didactic nor the experiential approach to the learning/teaching process with this group could stand alone. The project explored the connection between educational and social work approaches to learning through an analysis of John Dewey's experiential educational approach and those of social work educators Bertha Reynolds and William Schwartz. In formulating the methodology of the workshop the planning process was similar to that of the ILSPP. The structure of this workshop was informed by the

predetermined content and the experiences of the participants were key to adjusting that content in process. Lee further suggests that the "method is to 'work from the experience out,' or inductively derive the concepts and content to be 'taught' from the experiences presented and shared by the learners" (p. 132). In foster parent training groups, as was the experience of ILSPP, the on-the-job and life experiences of the participant group was of equal importance as the knowledge of the project staff.

While the Life experiences of the participants was essential to the training process, it is equally important that the training evidence planning, coherence and integration. Each module should be directed towards the achievement of clearly articulated learning objectives that have been cooperatively established. The ILSPP foster parents and adolescents were consistently involved in a collaborative process of searching for answers to the basic questions of: What are the skills needed for independent living and how are these skills best taught and learned?

Beyond these basic findings, the total ILSPP experience can serve as a guide for the implementation of an independent life skills preparation program. Such programs are intended to be one aspect of what should be a comprehensive array of predischarge services that are offered to both foster parents and adolescents.

Some writers in the field of foster parent training programs have related the retention of foster parents to the provision of stipends. Although a small stipend was given to the ILSPP participants the retention and motivation for consistent attendance appeared to have a closer association to the quality of the engagement process, and the

atmosphere of collaboration that was created. The retention of the participants was also influenced by a group process that was used to facilitate the development of a common group identity, shared values and a sense of cause and mission in the undertaking. These activities had the effect of increasing feelings of ownership and belonging to a mutual support group. In addition to these issues of engagement, retention was also influenced by the sense of goal accomplishment that was consistently experienced by the participants.

The experience of the project was that because training was conducted off-site and offered to foster parents from several agencies, unintended benefits were derived. Given this environment, the participants were able to more effectively engage in problem solving activities that were related to the issues of independent living. The digressive discussion related to dissatisfactions with agency programs, policies and services, that often characterize foster parent group meetings, were minimized.

Conducting sessions off-site and inter-agency also had the effect of extending the support network of the foster parents and establishing new supports for the adolescent. For the adolescent these new relationships have the potential for becoming supports in independent living through the establishment of friendship ties that could become resources for shared apartment living. A secondary goal of foster parent training programs has been that they provide a mutual support, self-help system for foster parents. This method of intervention has not been sufficiently developed in the practice with the foster adolescent. Foster care status continues to carry with it a high degree of stigmatization. The common bond that is shared by foster adolescents because of this status can be supported through this interventive

modality to promote relationships that can be continued in independence as well as reducing these feelings of stigmatization. The experience with the ILSPP adolescents further highlighted the need for planned activities that are directed towards assiting the adolescent achieve self-reliance in independence.

Preparation for independence and emancipation is a life-long process and much of what families provide for children, within a nurturing supportive environment, are those kinds of experiences that support a developing competency and mastery that incrementally prepare them for self-reliance. The foster child should be given these same opportunities as his inherent right within the context of a nurturing substitute family context that recognizes that the specialness of his circumstances may require an enrichment of these opportunities. Festinger (1983), in dialogues with former foster children does suggest that the availability of these kinds of experiences and opportunities cannot be assumed or left to chance. Many of the young adults who were interviewed for the study expressed dissatisfaction with the preparation they had received for independence.

The experiences of the ILSPP was similar. For while the largest percentage of foster adolescents participating in the project had been in the home of the initial placement for an extended period (M = 7.8 years), with one exception, they did not demonstrate a readiness for independent living as assessed by the Youth Questionnaire. The Youth Questionnaire obtained information on knowledge related to Money Management, Employment, Apartment Finding, Home Management, Health and Family Planning. This exception was the youth who had experienced intermittent periods of independent living.

Over and beyond the experiences provided in the foster home that are directed towards preparing the adolescent for independence as a normative process, agencies that provide service to children whose discharge plan is independence should have in place a structured program offering individual and group services that have the specific goal of preparation for independence, coupled with post-discharge follow-up services.

As service providers have become more aware of the need for continuity in care of this population, independent life skills preparation programs are becoming available. One example is a program developed by Ansell at the School of Social Work, Virginia Commonwealth University under the auspices of the United States Department of Health and Human Services, (Making It On Your Own, 1983). The components of an Independent Living program as developed by ILSPP were: Sense of Self as Black and Relatedness to the Black Community, Vocational/Occupational and Job Skills, Budgeting/Finance Management, Home Management/Housekeeping, Interpersonal Social Relationship Skills, Civic Responsibility and Sense of Community Service and Personal Hygiene. There is general consensus that these programs should include clinical services and concrete services in the broad categories as outlined by Festinger (1983, pp. 299-300).

- Counseling that addresses aducational, work and career objectives and choices: assessments of interests and skills; information about work and career options; information about educational opportunities, high school equivalency and vocational education programs, college programs and financial aid possibilities; and assistance with enrollment procedures.
- Vocational training and employment: The ABCs of applying for a

job assistance in finding work experiences during placement; training in marketable skills and trades; information on community resources for finding employment; assistance in locating post-discharge employment.

- Training in independent living skills providing experiences in handling money and information on budgeting; information and assistance on establishing savings accounts for earnings; information on various types of financial assistance; availability of supervised independent living settings prior to final discharge; information about how and where to find living quarters and temporary housing; assistance in finding housing; training and experience in shopping and cooking.
- Sex education and family planning: education on sexual matters, family life, and community facilities that provide information and counseling on family planning.
- Information about kin and other ties: providing an opportunity to discuss specifics of background; assistance in locating biological family members and others of the youths' choosing; information about various community groups that could provide companionship and links to adults.

An assumption that underlay the design of ILSPP was the services that are offered to families should reflect a sensitivity to the ethnicity of the groups making use of these sevices.

The largest number of adolescents and foster families making use of the foster care service delivery system in New York City are of African American origins. The activities of ILSPP reflected this common racial identity, which did positively effect the achievement of project goals.

The foster parents gave affirmation to the meaningfulness of this aspect of the training in their reactionnaires. These responses of foster parents supported the assumption that training content of Independent Life Preparation programs should acknowledge cultural variations within families and the dominant value orientations that influence family functioning of those receiving services.

The project design further incorporated the ethnical imperative (Lewis, 1982, p. 411) that opportunities to participate in the development of programs, policies, procedures and practice decisions affecting their lives should be made available to those groups making use of agency services. The integration of the intuitive knowledge and on-the-job experience of the foster parent and theoretical, professional knowledge of the project staff informed the development of the major practices and procedures of ILSPP. It is indeed timely for foster parents to be facilitated in a role that would extend the available resources of agencies. The experience of ILSPP further suggested that experienced foster parents can be provided with advanced training that will enable them to assume a major role in the implementation of these programs. The training strategy of the Behavior Management program did have a demonstrated effectiveness for supporting those attributes that could facilitate the development of teaching skills.

One foster parent was identified as an informal consultant to the project director. This foster parent was contacted after each session for evaluative feedback about the program as it developed in process. Overtime this relationship developed into one that was characterized by a mutuality that is reflected in collaborative, consultative encounters.

This foster parent demonstrated the greatest change in fostering

skill score and new behaviors that indicated personal development and self-growth. She successfully conducted two training sessions at her agency of affiliation. In conducting these sessions the integration of the ILSPP content was demonstrated. The role of informal consultant differentiated the experience of this foster parent from other group members, emphasizing the positive benefits that come from collaborative efforts that reflect a valuing of the contribution that the foster parent can make.

In support of the principle of the project design that encouraged collaboration, the major content areas for independent life preparation programs was reformulated as follows:

Module I	Orientation to the Program
Module II	The Child Welfare System/Historical Relationship to Black Families
Module III	Self-Awareness
Module IV	Psychosocial Growth and Development Developmental Tasks of Adolescent
Module V	Promoting Skills of Independent Living
Module VI	Assessment and Planning/Reinforcing the Traditional Values of Black Family Life
Module VII	Practicing Skills of Independent Living
Module VIII	Negotiating Systems/Developing Support Networks

The ILSPP experience suggests policy implications for foster agencies in the formulation of adolescent placement agreement. Although all of the ILSPP foster parents had experience in adolescent fostering, their approach to the work was that of substitute parent. At the beginning of the project the largest number of foster parents expressed a preference

for the substitute family agreement. This model is incongruent with the developmental needs of the adolescent and promotes ongoing conflicts with the policies of the system and with natural parents.

A troublesome finding of the project was the clear orientation of foster parents to exclude natural parents from participation in the life of the adolescent. However, if the adolescent is to achieve identity consolidation it is imperative that he establish a sense of comfort with his origins and a view of self as a part of these origins yet separate and distinct from them. When foster parents view their role as parent substitute, there is a tendency to denigrate the natural parent as opposed to assisting the youngster to accept their limitations and not equate their worthiness to parental problems. Many adolescents continue to have a need to "romanticize" the birth parent, therefore, when the foste parents' view of their role moves them away from competing with natural parents there are more opportunities for assisting the adolescent to resolve conflicting feelings about them.

The role of the foster parent as mentor may be more effective in assisting the foster adolescent resolve difficult issues associated with the process of identity consolidation. Importantly, the adolescent can be helped to resolve these conflicts and learn skills of independence within a family environment. The ILSPP adolescents consistently expressed the need to belong to a family unit. One youngster captured the ambivalence of the group in the choice of both a substitute family agreement and contract agreement, suggesting that "everybody needs to have a family, it should be a little of both."

When the ILSPP terminated there was a dramatic shift in the foster parents' preference for the placement model. The largest number of

foster parents at post intervention expressed a preference for the contract agreement. The foster parents who participated in the project consistently performed as independent thinkers. This shift, therefore, is viewed as a result of the ILSPP experience.

The participants' evaluation of the program at termination gave consistently high ratings to the total program and each training module. There was a general consensus that sufficient time had not been allocated for the implementation process. All foster parents and adolescents expressed a desire to continue. As a result of the informal systems that had emerged during the course of implementation, a network was established for the group to maintain ongoing contact with one another.

Recommendations

Preventive services should be offered as the first stage of intervention with troubled families. However, even when these services are offered many parents will remain unable to provide their children with a protected and nurturing family environment. In these instances, when out-of-home care is indicated, placement in an individual foster family home is the preferred form of care. This form of care can be planned in ways that successfully meets the needs of a range of age groups of children. For the adolescent this form of care can provide a means for easing the transition to independent community living.

Foster care services should be organized in a continuum of care and offered within a service delivery framework that is sensitive to the ethnicity of the families making use of services. Agencies that provide these services can effectively use planned group interventions that are organized as independent life skills preparation training programs and offered as pre-discharge services to foster parents and adolescents whose

discharge plan is to independent community living. These programs would represent one form of the comprehensive array of services that are provided in this continuum of care.

There are several possibilities for designing independent life skills programs for foster parents and adolescents. These programs should include a variety of interventive procedures. Many of these procedures can be found in established foster parent training programs and the newly developing independent skills programs that are directed exlusively to the adolescent.

While the content of these programs is best developed in collaboration with the program participants, the components of independent life preparation programs as described here reflect the core content of these programs and can be used as a guide for the development of "tailor made" programs.

Group composition and instructional format are important variables that affect training outcome and should be considered in the design of these programs. When the adolescent and foster parent are involved in conjoint training sessions the learning environment is enriched. There are increased opportunities for a greater variety in relationships and activity patterns that emerge that support the overall goals of training. Importantly, this method of intervention promotes an empathetic identification between the adolescent and foster parent. As well, opportunities are provided for the resolution of conflicts and stresses that are typically associated with the adolescent fostering relationship. These conflicts can be resolved within the context of a supportive mutual support group which further assists the adolescent to appropriately challenge traditional values and adult authority figures.

This method also permits greater opportunities for small group experiences that serve as behavioral rehearsals of skills needed for independence.

When training sessions are conducted with foster parents alone, the cognitive behaviors that are needed for fostering are reinforced. There is a tendency on the part of the foster parent to treat the adolescent as if he were their own child. This orientation poses dilemmas for the youth, engenders role confusion and promotes a lack of authenticity in relationships that are dysfunctional to the process of identity consolidation and interpersonal skill development. Conducting training sessions with the adult caretaker alone minimizes this "as if" quality of the fostering relationship and is an effective strategy for addressing these issues of adolescent fostering.

The number of sessions that will be needed to achieve the learning objectives of each module was not predetermined. However, a nine-month period is seen as an adequate time frame for completing the major goals of training. There is also the option for recontracting with the participants at termination for a continuation of the programs under a different format.

The components that are presented here are best delivered in an informal small group setting that emphasizes collaboration and cooperation. The program is intended to be offered as a total unit to a closed membership group of adolescents and foster parents with opportunity for conjoint and separate sessions. Group sessions should be structured consecutively with each session lasting for two hours. The sessions should be co-led. Additional benefits are gained if an experienced foster parent serves as co-trainer with an agency staff

person.

The early sessions of independent preparation programs can be held conjointly. The major work of these sessions is to be devoted to contracting, engagement, developing the content of subsequent training sessions and exploring the concepts of the contract placement agreement. This process should include a clear explication of the roles of the agency social worker, foster parent and adolescent. In establishing the parameters of this placement model, attention should be given to the adolescents' continuing need to feel that he is a part of a nurturing family unit that he can call on for support in independence.

Middle sessions can be conducted separately. Sessions that are conducted with foster parents can be used to provide information about the historical development of child welfare services and current issues in the delivery of foster care services. Importantly, the process during this phase of training should encourge the development of a relatedness to the cause that is embedded in the work of child welfare. Experiential activities should be developed that focus on the positive outcomes of the fostering experience. An additional task of these sessions is to assist the foser parent identify his unique parenting style and develop mentoring techniques that are individualized to meet the needs of the adolescent. These sessions provide opportunities to explore cultural variations in families and child-rearing practices.

For the adolescent, these middle sessions that are held separately, provide an opportunity to identify the tensions in the current substitute care home, explore feelings related to foster care status and approaching independence. An essential function of these separate adolescent groups should be the establishment of support peer network that can become

resources in independence--particularly for shared apartment arrangements.

Later sessions can bring the participants together again in conjoint sessions. The goal of these later sessions is to explore and practice the skills that are needed for independence. The identification of new systems that will be needed in independence and the skills needed to negotiate these systems are important tasks of these later sessions. These sessions should be developed to become very specifically task-oriented work sessions, i.e., resume writing, college/vocational training applications, job application, requirements for entry into the Armed Services, apartment finding, etc. A requirement of this phase of the training is for each adolescent to develop in consultation with his foster parent and social worker a goal directed independent living plan proposal. Ongoing sessions should provide a means for assisting the foster parent and adolescent to resolve the problems that are encountered in achieving the intermediary objectives that should be reflected in these plans.

All sessions should use a variety of instructional materials and the use of experiential activities emphasized. The later sessions will generate a wealth of "life instructional" materials as the group works to implement the adolescent's independent living proposal. The use of logs and diaries should be encouraged as a means for self-observations of behaviors.

The ILSPP experience does suggest that the interventive techniques that are described can successfully be used to develop programs and services that address the identified gap in services to foster adolescents. The project leaves unanswered the question of identification and recruitment of adult caretakers who possess those

attributes that will enable them to effectively perform in this proposed new fostering role of role model/mentor. This is an area for further inquiry.

Implicit within the development of ILSPP was the assumption that black children have not received equitable treatment within the child welfare system. The largest number of families needing child welfare services are those groups who lack sufficient financial resources and access to those services that will empower parents to protect the integrity of their families and provide nurturing experiences for their children. Poverty continues to be the single most significant variable effecting family stability and the well-being of children. Statistical reports of the Children's Defense Fund indicate that 133 million American children are living in poverty. Given the character of American life, black children will continue to be disproportionately represented in these numbers.

All children are in fact the collective responsibility of society. The child welfare system was designed as the means for assuming this responsibility and is a reflection of society's caring and valuing of all children. The foster care system, as one aspect of child welfare services, has more than any other service delivery system been called upon to undertake its work in the full glare of the public eye. Policy development has more often been formulated in response to litigation that has come about as a result of media coverage that highlights the worse of the system but seldom pays attention to its accomplishments. Programs, therefore, continue to be planned under the legal monitoring of the judicial system. One consequence of the occurrences of the last two decades has been a decreasing visibility of the profession of social work

in this field, resulting in some gains and some lossess. The re-involvement of the profession at the policy and decision-making levels, however, seems to hold the hope of reestablishing cause and function in the field of child welfare and ensuring that program development is informed by a professional value system that believes in the inherent worth of each individual and his rights to full self-actualization. Meyer (1986) eloquently advocates for the profession to recapture the field of services to families and children from the lawyers, judges and MBA's. The ILSPP experience suggests a possibility and opportunity for accepting this challenge.

APPENDICES

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CODE # _____

YOUTH QUESTIONNAIRE

INDEPENDENT LIFE SKILLS PREPARATION PROJECT

1. What is your sex?

   a. Male _____ b. Female _____

2. Please state your age. _____ years

3. What is your current school grade? _____

4. I am employed as a _____.

5. I am not employed. _____

6. What is your religion? _____.

7. How long have you been in foster care? _____ (yrs., mos., wks.)

8. Which of the following statements best describe you?

   a. _____ I prefer to make my decisions alone and on my own.

   b. _____ I prefer to discuss my thoughts with an adult or with someone that I trust before coming to a final decision.

   c. _____ I prefer to take things as they come and "go with the flow".

9. If you are a youth who is sixteen years of age or older and being placed in a foster home for the first time, which of the following arrangements would be the most acceptable to you?

   a. _____ A Contractual Arrangement between me, my foster parent and the placing agency, with my foster parent serving as a kind of role model and mentor, or someone who would teach me by example and in other ways all of the responsibilities of adult living.

   b. _____ A Boarding Home Arrangement between the foster parent and the placing agency. The foster parent would provide for my room, board and physical care only so long as I obeyed and respected the house rules.

   c. _____ A Substitute Family Arrangement where my foster parents would act as my own parents, providing love, discipline and making me feel that I belonged to this new family.

NOW FOR SOME QUESTIONS THAT ARE RELATED TO INDEPENDENT LIVING. REMEMBER THAT THIS IS NOT REALLY A "TEST" AND OFTEN THERE ARE NO RIGHT OR WRONG ANSWERS. SO RELAX, ANSWER ALL OF THE QUESTIONS AND CHOOSE THOSE RESPONSES THAT MOST CLOSELY REPRESENT YOUR POINT OF VIEW.

1. Listed below are some abilities and skills, indicate the degree of importance that you feel each is to independent living by placing a check in the appropriate box.

RANK	ABILITIES/SKILLS	NOT AT ALL	SLIGHTLY	MODERATELY	EXTREMELY
____	Personal Hygiene/ Cleanliness				
____	Civic Responsibility/ Sense of Community Service				
____	Vocational Occupa- tional/Job Skills				
____	Home Management/ Housekeeping				
____	Budgeting/Finance Management				
____	Sense of Self as Black/Relatedness to Black Community				
____	Interpersonal/Social Relationship Skills				
____	Other (Specify)				

2. Now that you have indicated how important you think each of these abilities/skills are to independent living, will you rank each in order of their priority, i.e., 1=the most important, 2=the second in importance, etc. Place a number on the line to the left of each ability/skill.

WILL YOU NOW TURN TO THE NEXT PAGE AND ANSWER SOME QUESTIONS THAT ARE SPECIFICALLY RELATED TO THESE SKILLS OF INDEPENDENT LIVING.

1. Can you list at least three resources, people or places, that could be helpful to you when beginning to look for a job?

   a. _____

   b. _____

   c. _____

2. Can you list at least four things that are important for you to know or do when going on a job interview?

   a. _____

   b. _____

   c. _____

   d. _____

3. When looking for an apartment to rent, an important rule to follow is that your monthly rent should not be more than 25% of your monthly income.

   True _____ False _____ Unsure _____

4. What is meant by utility bills?

   a. _____ life, fire & health insurance

   b. _____ telephone, gas & electric costs

   c. _____ personal expenses (including grooming, clothing & entertainment)

5. Unit pricing is a convenient way to:

   a. _____ do comparative price shopping at the grocery or food store

   b. _____ determine how much each load will cost at the laundromat

   c. _____ is something that should be avoided since the real cost of individual items is never known

6. When grocery shopping which of the following are smart tips to keep in mind?

   a. _____ never go grocery shopping when you are hungry

   b. _____ always shop with a grocery list

   c. _____ avoid shopping in small neighborhood stores

   d. _____ all of the above

7. If you were living on your own and needed to make up a personal budget, which of the following items would you include?

   a. _____ savings

   b. _____ rent

   c. _____ utilities

   d. _____ transportation

   e. _____ recreation

   f. _____ all of the above

8. How often would you say an adult should have a complete physical examination?

   a. _____ every six months

   b. _____ once each year

   c. _____ every two years

   d. _____ if under thirty years of age and in good health an adult need only go for a physical examination when feeling bad

9. Can you give the name and address of the hospital that is the nearest to your home?

   NAME _____
   ADDRESS _____

   Does it have an emergency room? Yes _____ No _____ Unsure _____

10. Who is responsible for protecting a couple against pregnancy?

    a. _____ the male
    b. _____ the female
    c. _____ both are

11. Can you list at least three types of birth control?

    a. _____

    b. _____

    c. _____

12. Of the three types of birth control that you listed, which do you think is the most effective?

    _____

13. The two most common types of Venereal Disease are:

    a. _____ Diptheria and Halitosis
    b. _____ AIDS and Herpes
    c. _____ Syphilis and Gonorrhea

14. What are some of the symptons of Venereal Disease?

    a. _____ A rash on any part of the body
    b. _____ Itching and pain when urinating
    c. _____ Pus discharge from the penis
    d. _____ All of the above

15. Many young people have a lot of knowledge and information about alcohol and drugs that they may have obtained from educational programs or even first hand experimentation. Some of this information is myth and some is fact. Check out how much you really know by answering true or false to the following:

	TRUE	FALSE
a. Alcohol, tobacco and caffeine are all physically addictive drugs.	____	____
b. Use of angel dust can cause permanent and irreversible brain damage.	____	____
c. Drinking coffee or taking a cold shower can help a person sober up.	____	____
d. Marijuana smoke can cause cancer.	____	____
e. Sniffing chemicals can result in death.	____	____
f. The use of any drug during pregnancy can be harmful to an unborn child.	____	____
g. Excessive drinking increases sexual desire and pleasure.	____	____
h. The law allows the individual to receive medical help for drug problems without legal penalties.	____	____

16. What is the legal voting age in New York State? _____ years

17. Can you list the names of at least three minority (Black or Hispanic) politicians in the New York metropolitan area or on the national scene?

    a. _____
    b. _____
    c. _____

18. Voting should be considered to be everyone's civic responsibility and duty. Therefore, everyone who is of legal age should register to vote.

    Agree _____ Disagree _____

19. Can you name and list at least three Historically Black Universities or Colleges?

    a. _____

    b. _____

    c. _____

20. A major problem or problems facing the Black community today would be:

    a. _____ An increase in teenage pregnancy.

    b. _____ An increase in single parent female headed homes.

    c. _____ Large numbers of youth are unemployed.

    d. _____ All of the above.

21. Who is W.E.B. DuBois?

    a. _____ A Black Educator/Scholar and Writer

    b. _____ A French Diplomat

    c. _____ A Black Entertainer/Musician

22. Color and race is of little significance today and anyone who is really motivated and wants to can make it.

    Agree _____ Disagree _____

NOW FOR A FINAL EXERCISE ON MONEY MANAGEMENT AND BANKING SKILLS. TURN TO THE LAST PAGE OF YOUR QUESTIONNAIRE WHERE YOU WILL FIND TWO BLANK CHECKS AND A BLANK DEPOSIT SLIP. NOW COMPLETE QUESTIONS 23 AND 24.

23. Make check #101 out to the New York Telephone Company in the amount of $33.81 and check #102 out to Foodtown Grocery Store in the amount of $21.79. Enter both in your cash register.

24. Make out the deposit slip so that it will show the deposit of your payroll check in the amount of $250.63 and your birthday gift in cash from your foster parents.

FINIS!

ILSPP

FOSTER PARENT REACTIONNAIRE

CODE # _____

By answering the following questions you will be providing the project staff with valuable information that will be used in planning continuing educational programs for foster parents. You should be thoughtful and open in your responses and answer all questions. The rating is based on a scale of 1 to 4 as follows:

1	2	3	4
NOT AT ALL	SOMEWHAT	VERY MUCH	EXTREMELY

The overall training program was very relevant to preparing youngsters for independent living.

1 2 3 4

SELF-AWARENESS

This session was helpful to me in my work as a foster parent.

1 2 3 4

The session content was related to the overall goals of training.

1 2 3 4

The Trainer was knowledgeable and created an atmosphere for group sharing and learning.

1 2 3 4

HUMAN DEVELOPMENT/DEVELOPMENTAL TASKS OF ADOLESCENCE

This session was helpful to me in my work as a foster parent.

1 2 3 4

The session content was related to the overall goals of training.

1 2 3 4

The Trainer was knowledgeable and created an atmosphere for group sharing and learning.

1 2 3 4

ASSESSMENT AND PLANNING/BLACK FAMILY LIFE STYLE

The session was helpful to me in my work as a foster parent.

1 2 3 4

The session content was related to the overall goals of training.

1 2 3 4

The Trainer was knowledgeable and created an atmosphere for group sharing and learning.

1 2 3 4

BEHAVIOR MANAGEMENT/FOSTER PARENT PRACTICE

This session was helpful to me in my work as a foster parent.

1 2 3 4

The Trainer was knowledgeable and created an atmosphere for group sharing and learning.

1 2 3 4

SYSTEMS NEGOTIATION/COPING WITH BURNOUT

This session was helpful to me in my work as a foster parent.

1 2 3 4

The session content was related to the overall goals of training.

1 2 3 4

The Trainer was knowledgeable and created an atmosphere for group sharing and learning.

1 2 3 4

What parts of the course were the most helpful to you and why?

Which parts of the course were the least helpful to you and why?

Which parts of the course do you find yourself using the most in your work as foster parents?

What suggestions do you have for improving the course?

Code # _____

FOSTER PARENT QUESTIONNAIRE
INDEPENDENT LIFE SKILLS PREPARATION PROJECT

Please Circle The Appropriate Response

1. What is your sex?
   1. Male
   2. Female

2. What is your age?
   1. 25-29
   2. 30-34
   3. 35-39
   4. 40-45
   5. 45-49
   6. 50-54
   7. 55-59
   8. 60 +

3. What is your marital status?
   1. Married
   2. Divorced
   3. Widowed
   4. Separated
   5. Never Married

4. What is the highest school grade you have completed?
   1. Elementary School
   2. Junior High School
   3. Senior High School
   4. College

5. What is your employment status?
   1. Employed Full-Time
   2. Employed Part-Time
   3. Employed Occasionally
   4. Not Employed

6. What is your occupation?
   _____

7. Do you own your own home?
   1. Yes
   2. No

8. How many years have you been a foster parent?
   _____ years

9. What is your religious denomination or preference?
   _____

10. Complete the information below about all of your own, biological children:

AGE	SEX	SCHOOL/OCCUPATION	LIVING AT HOME NOW	
			Yes	No
___	___	_____	___	___
___	___	_____	___	___
___	___	_____	___	___

11. Complete the information below on all foster children who are presently placed in your home:

AGE	SEX	SCHOOL/PROGRAM	LENGTH OF PLACEMENT (years/months/weeks)
___	___	_____	_____
___	___	_____	_____
___	___	_____	_____

NOW FOR SOME QUESTIONS ABOUT FOSTERING THE OLDER ADOLESCENT. REMEMBER THAT THERE ARE NO RIGHT OR WRONG ANSWERS, SO BE AS CANDID AS POSSIBLE AND SELECT THOSE RESPONSES THAT MOST CLOSELY REPRESENT OR EXPRESS YOUR POINT OF VIEW.

1. Listed below are some abilities and skills. Indicate the degree of importance that you feel each is to independent living by placing a check in the appropriate box.

RANK	ABILITIES/SKILLS	Not At All	Slightly	Moderately	Extremely
_____	Personal Hygiene/ Cleanliness				
_____	Civic Responsibility/ Sense of Community Service				
_____	Vocational/Occupational Job Skills				
_____	Home Management/ Housekeeping				
_____	Budgeting/Finance Management				
_____	Sense of Self as Black/ Relatedness to Black Community				
_____	Interpersonal/Social Relationship Skills				
_____	Other (Specify)				

2. Now that you have indicated how important you think each of these abilities/skills are to independent living, will you rank each in order of their priority, i.e., 1=the most important, 2= the second in importance, etc. Place a number of the line to the left of each ability/skill.

3. Which of the following best describes your foster parenting style?

a) _____ Authoritarian b) _____ Democratic c) _____ Permissive

4. Place a check next to that response that most closely describes how you would respond to the following situations. (IT IS IMPORTANT TO CHECK ONLY ONE RESPONSE).

   You have just discovered that your 16-year old foster daughter has been having sex with her boyfriend and is not using birth control because of his objections.

   a__ Let her know that such behavior is irresponsible and she should stop.

   b__ Discuss the situation with her.

   c__ Give her the freedom to make her own decision.

   Your foster child has not been attending school because he/she feels that the teacher is prejudiced and treats him/her unfairly. In discussing the situation would you attempt to assist the youngster to understand that:

   a__ Color and race is of liffle significance today and anyone who is motivated and really wants to can make it.

   b__ Racism is always present in all situations and young people need to understand that and be prepared to cope with it.

   c__ Some situations are the result of racism, however, youngsters need to be prepared to accept responsibility for their own behavior and shortcomings.

   Ben has been temporarily placed in your care while awaiting court hearing for grand theft, his first offense. He was not returned to his own home because of his assaultive behavior towards an abusive stepfather and an alcoholic mother. In relating to Ben it is important for the foster parent to:

   a__ Let Ben know who is in control and that any deviations from the foster home rules will result in his being remanded into the custody of the court.

   b__ Be noncommittal and very observant of Ben's behavior.

   c__ Set supportive but firm and consistent limits for Ben.

5. Check that response that most closely describes what you think makes some youngsters behave in troublesome ways.

   a__ Past life experiences

   b__ Lack of motivation

   c__ Nature or heredity

6. Do you think that what you do for or with your foster youngster can make a difference in his/her behavior and future? Yes_____ No_____

7. List three developmental tasks of adolescence:

   a. _____
   b. _____
   c. _____

8. Indicate your agreement or disagreement with the following statements:

	AGREE	DISAGREE
Most black children are brought up by single mothers who live on welfare.	_____	_____
Most black men desert their families and are unwilling to provide economic support to children.	_____	_____
Social workers in the past have been too quick to remove black children from their biological homes.	_____	_____
Natural parents most often have so many problems that it is generally best to discourage all contact with youngsters who are adjusting well in foster care.	_____	_____
Adolescents need to have contact with their biological parents and the foster parent should not attempt to be a substitute parent.	_____	_____
Fostering is natural to black families since such families have traditionally cared for children whose parents were unable to do so.	_____	_____

9. In accepting an adolescent 16 years or older for placement in your home, which of the following arrangements would be the most acceptable to you. PLEASE READ CAREFULLY AND CHECK ONLY ONE.

   a__ A Contractual agreement between me, the youngster and the placing agency with my role being that of a role model or mentor with responsibilities to teach the youngsters all of the responsibilities of adult living.

   b__ A Boarding Home agreement between me and the agency with my role being that of custodian with responsibilities to provide physical care only as long as the youngster respected the rules of my home.

   c__ A Substitute Family agreement where my role would be that of parent with responsibilities for providing discipline, love and assisting the youngster to develop a feeling of attachment and belonging to his/her new family.

10. Do you feel that black parents and families must provide something additional to children because of their minority group status?
Yes_____ No_____

11. If yes, what must parents provide?

a. _____

b. _____

c. _____

12. If yes, what must families provide?

a. _____

b. _____

c. _____

13. List the three most problematic behaviors that you have been faced with as the foster parent of an adolescent:

a. _____

b. _____

c. _____

14. Of the problematic behaviors listed above, have you felt that you were capable of managing these on your own in a way that was helpful to your youngster?

Always _____ Sometimes _____ Never _____

15. If faced with the rebellious, challenging behavior of an adolescent, which of the following would be the most typical response for your: (CHECK ONLY ONE)

a__ Try to understand the meaning that the behavior may have for the youngster and be selective in my response.

b__ Recognizing that this is not appropriate behavior for one approaching adulthood, remind the youngster that this was the kind of behavior that led to problems in his own family, insist that the behavior change or he will have to leave my home.

c__ Report the behavior to the social worker and recommend that the youngster be referred for counseling.

16. NOW FOR SOME QUESTIONS THAT WILL LET US KNOW HOW MUCH YOU KNOW ABOUT SERVICES THAT MAY BE HELPFUL TO YOUNGSTERS WHO ARE BEING DISCHARGED FROM FOSTER CARE TO INDEPENDENT LIVING.

		YES	NO	UNSURE
a.	The Pell Grant, BEOG would be of interest to a youngster who wants to enroll in college.	___	___	_____
b.	To apply for working papers, a youngster may need to obtain information from the office of vital statistics.	___	___	_____
c.	A male 18-year old with a disability may be eligible for AFDC upon discharge from foster care.	___	___	_____
d.	The GED is a useful alternative to the high school diploma.	___	___	_____
e.	All youngsters who are unemployed when discharged from foster care are eligible for welfare assistance and should be encouraged to apply.	___	___	_____
f.	The school nurse at the local high school can provide a youngster with free, confidential counseling, contraceptive devices for family planning and treatment of venereal disease.	___	___	_____
g.	There is no city office of employment that provides special services to the adolescent in need of job skills training.	___	___	_____

17. When youngsters are not able to successfully establish themselves as emancipated adults in independent living after discharge from foster care, which of the following do you feel is the most responsible for this failure:

a__ The youngster's lack of motivation

b__ The lack of advance planning on the part of agencies and social workers.

c__ The inability of foster parents to assist youngsters in helpful ways.

18. Finally, how would you rate yourself as a foster parent?

0--Excellent
1--Good
2--Fair
3--Poor

CURRICULUM CONTENT AREAS

Self Awareness
Human Development/Developmental Tasks of Adolescence
Assessment and Planning/Black Family Life Style
Behavior Management/Foster Parent Practice
Systems Negotiation/Coping With Burn Out

Self Awareness

Insight into one's own behavior is an important characteristic of all human service workers. Self awareness is required for clarity and perspective on what one is doing and why. Foster parenting is often viewed as an extension of parenting, which has been perceived as a natural intuitive process. However, foster parenting is more accurately described as "parenting plus" in that the foster parent must not only have knowledge of the complex child welfare system, agency policy and structure, but must as well be able to relate to the special emotional concerns of the child as related to his developmental stage and to his foster care status. The foster parent of the troubled adolescent is faced with coping with the difficult developmental concerns of adolescence as well as to the adolescent's often confronting, manipulative and provocative behavior, and must do so within a system of legal mandates and guidelines that place limits on his choices of action. The foster parent must be sure that their behavior is motivated by the underlying or expressed needs of the adolescent rather than to their own, and that they are utilizing planned interventions that are directed towards moving the youngster towards independent living as opposed to behavior that is reflective of their own need for control or sense of frustration with the inconsistencies of the system.

Billingsley has posited that as a result of a cultural heritage and restrictive social system, the black family has evolved as an adaptive system that is particularly well-suited to rear black children to survive and achieve in a large society that is often unsupportive of his needs. Implicit within this is the assumption that the black parent has developed parenting styles and skills that facilitate this process of adaptation. The self awareness sequence should assist the foster parent to identify his unique parenting skills and style so that these may be transferred to the fostering experience.

Prior to the 1960's with the publication of Billingsley's Black Families In White America, the strengths of black families were seldom related to. The Black family was assessed primarily from a point of view of a deficient model and appeared different, dysfunctional and pathological. Moynihan described the black Community as a "tangle of pathology" at the heart of which was the black family, and provided a framework for the governmental policy that was to assume a position of "benign neglect". A stance of "blaming the victim" has supported a proliferation of myths and stereotypes that are related to black family functioning. The point of view has become acceptable to those who determine public policy to some extent and has become integrated into the self perception of many blacks. Robert Hill in his book The Strengths of Black Families made a

significant step in removing the myths and stereotypes that have been associated with black family life as he enumerates: (1) Strong kinship bonds, (2) Strong work orientation, (3) Adaptability of Family Roles, (4) High Achievement orientation as documented characteristics of Black family life that have been instrumental to the survival of a group. Insights into these dynamics should assist the foster parent in valuing and understanding the process of his own family life and to the development of a more empathetic connection to the natural parents of the children that he is fostering. Self awareness and a Black perspective will be integrated throughout the content of both training modules, although will be specifically dealt with in Sessions I and II, which will focus on foster parenting styles and values clarification.

Human Development

Foster parents need information about human growth and development, developmental tasks of each stage and the problems that develop as a result of faulty resolution. Often in their frustration and inability to effect immediate change in the adolescent's behavior, the foster parent will seek explanations of behavior in such lay theories as that of the "bad seed". An important learning task for the foster parent is to become able to determine that past experiences are associated in a causal relationship with the current level of adjustment that is attained by the adolescent, and to view their role as one of providing experiences of remediation, re-education and resocialization.

Although not exhaustive, this sequence attempts to connect psychological developmental theory and the special developmental concerns of the minority adolescent, particularly as related to identity consolidation, to foster parenting. Erickson's framework of the Eight Stages of Man will provide the major theoretical base for teaching content. Session IV, which is concerned with Adolescent Growth and Development will focus on characteristics problems of adolescents such as sexual promiscuity, substance abuse and poor school and/or vocational performance. Kenneth Clark's DARK GHETTO will provide a framework for conceptualization related to negative resolutions of developmental tasks, integration of personality and movement into career and vocational areas for minority youth.

The impact of the social environment is integrated into the content, emphasizing the effects of social problems for the individual's attained level of adjustment.

The meaning of separation and loss will be stressed in both sequences, with particular emphasis on the adolescents' status of being high risk for placement breakdown, a situation that reactivates the feelings that are associated with the original separation and often preclude him from making successful attachments and encourages him to recreate situations that perpetuate the cycle of rejection.

Assessment and Planning

Foster parents need to develop means for assessing what each adolescent's

major problems are and skills in the formulation of plans for helping the youngster to adjust within the family system while utilizing the supports of that system to provide re-socialization experiences for him. Major activities in fostering the adolescent should be directed towards the preparation of the youngster for independent living.

This sequence, which incorporates black family life style, will focus upon the unique characteristics of the family system. A major theme will be that of the utilization of a "contract model" for the incorporation of the youngster into the existing family structure. The role of the foster parent is conceptualized as that of mentor/role model.

The collaborative aspect of planning with the agency and social worker will be stressed, and the utilization of contracting and negotiating sessions that will involve the social worker, the foster parent and the adolescent. The adolescent is to have major input in formulating his plan of care and in the process of assessing his movement towards achievement of planning goals. An underlying assumption is that no plan of "treatment" is implemented or placement contract terminated without full participation of the social worker, the adolescent and the foster parent. The Uniform Case Record may be effectively used as the framework within which this process can take place.

Behavior Management/Foster Parent Practice

This sequence will bring together all of the learnings of the previous sessions with the trainers focusing upon the process of enabling foster parents to identify those most characteristic and problematic behaviors presented by the youngsters, with a resultant development of useful interventive strategies. Emphasis will be placed upon the mediation and prevention of crisis situations with major goals being directed towards the stabilization and retention of the youngster in placement.

The overall goal of this sequence is to assist the foster parent to respond to the adolescent in a planful and sensitive manner, to practice attitudes and skills, and provide role modeling experiences that encourage the adolescent to develop self control, self responsibility and self direction. The foster parent will be encouraged to develop educational and developmental approaches that will enhance the adolescent's feelings of self-esteem, sense of self, and the motivation to grow towards full potential, and to develop and practice attitudes and skills that will foster open two-way communication with adolescents. Developing skills in reflective listening and the ability to respond to verbal and non-verbal communication are important learning goals.

Systems Negotiation/Coping With Burn Out

This sequence will focus on empowerment issues and will bring together the parents of both training modules. The session will be conducted by an experienced foster parent from an outside agency and an experienced social worker who is knowledgeable about the child welfare system, entitlement programs, and related support service delivery systems.

Foster parents are often faced with coping with the survival issues of their own life situations. Child welfare mandates now require that the foster parent be engaged in direct service activities on behalf of their foster children. Activities that were once the responsibility of the social worker or other agency support staff, such as negotiating re-instatement in or school enrollment, follow-up on medical or other recommended appointments, assisting in the attainment of employment, social security cards and birth certificates, belong to the foster parent. In order to fulfill these tasks the foster parent must take time away from employment, which is stress producing, and must negotiate systems that he may or may not have prior knowledge of. The foster parent is consistently subject to an outside evaluation of his performance. For many the boarding rate reimbursement provides an important means for augmenting family income. The threat of removal of a child or loss of license may have serious implications for the foster family's financial stability.

This sequence is in part directed towards providing the foster parent with information on about support service delivery systems, his rights as foster parent and providing him with a means of recognizing and coping with stress related symptoms.

Foster parents may have few experiences that support and give value to the work of foster parenting. The extended family concept will be developed as one support system utilizing the concepts and structure of self help groups.

Structure of Sessions

While a suggested format for sessions is provided, all trainers are encouraged to be innovative and creative in the development of training content, while adhering to the overall goals and philosophy of the project and insuring that the content developed is directed towards the achievement of the learning goals and objectives and behavioral changes of the sequence. The general format of the sessions is that of a lecturette, group discussion, lab/experimental activity and log assignment. All sessions are scheduled for two hours, will take place in an attractice physical setting, and refreshments will be made available.

Training and education are not identical. Ecuation is concerned with imparting knowledge. Training with imparting knowledge as well as with developing skills and influencing attitudes. In the development of learning experiences for adults, it is recognized that he brings to the learning situation a wealth of information from his life experiences. The role of the trainer becomes that of facilitator, assisting the foster parent to become aware of that knowledge and make it useful in the learning situation. Because of the underlying philosophical orientation of the project, the trainer must additionally maintain an ethnic-sensitive perspective in his interactions with the foster parent group.

THE BEHAVIORAL/MANAGEMENT SKILLS MODULE

SESSION I

Orientation

The Orientation session will be conducted by the Project Director, and will provide the "contracting" session with foster parents. The Project director will present and reveiw the course outline with the foster parents, allowing opportunities for their reactions and input.

Foster parents are responsible for attending all eight sessions with promptness in arrival being stressed and for maintaining a log in which they are to relate significant learnings of each session to in-home experiences with children. Logs will be reviewed by the Project Director at the end of the fourth and seventh sessions, and comments made on the foster parents indicated integration of the course content.

All foster parents will receive a certificate at the termination of the Project. In order to be eligible for the certificate, foster parents must have attended at least six of the eight sessions and completed all required assignments.

The pre-test will be administered at the orientation session. Becuase of the differing educational levels of foster parents, and anxiety that may be associated with test taking, the Project Director will go over each item with the group, minimizing anxiety, clarifying and answering questions as needed. The purpose of the testing will be clearly stated, informing participants that the post-test will be given at the end of the training cycle. Foster parents will be asked to use the first three digits of their social security number or telephone exchange for identification purposes.

The first assignment will be given, which will be the completion of an autobiographical sketch, that will be used in Session II.

SESSION II

Self Awareness

FOSTER PARENTING STYLE

Lecturette

The presentation will focus on the role of foster parent as change agent; philosophy related to attitudes and value assumptions about how changes are brought about, and what the foster parent can do to facilitate change in youngsters. The lecturette should include Roger's discussions of the characteristics that make for an effective therapist, as well as each individual's inherent capacity for growth and change.

The trainer will facilitate a discussion that will identify the predominate parenting styles present in the group, at least one of which

should be the authoritarian parenting style. Subsequent discussion should focus upon which style seems to work best with which adolescent and behaviors. Emphasis should be placed on identifying those styles which appear to be more useful in assisting the adolescent to move towards self-sufficiency and independent living.

Lab/Experiential Activity:

Participants will break into small groups for a more in-depth discussion of their autobiographical materials, identifying those parenting styles that appeared more prevalent in their families of origin. Did natural parents make differential use of self in relating to siblings. Black family life style should be a prevailing theme.

Log Assignment:

The foster parent should identify at least two learnings that evolved from the session, identify their own parenting style and identify at least two situations in which they would use a * certain style and why.

Behavioral Objectives:

At the end of the session the foster parent will be able to:

(1) Define the identified foster parenting styles and the techniques and rationale of each.

(2) Identify his own primary parenting style.

(3) State at least one situation for which each style seems most effective.

Behavioral Changes:

(1) Foster parents will be more flexible and individualize their approach to the adolescent.

(2) Foster parents will broaden their range of parenting skills be observing the parenting styles of other foster parents in the group.

(3) Foster parents will be able to assist in the placement process by accepting for placement those youngsters more closely matched to their parenting and life style.

(4) Foster parents will evidence an increase in awareness of the special parenting issues related to minority youngsters.

SESSION III

Self-Awareness

VALUES CLARIFICATION

Lecturette:

(In preparation for the Session, the participants will be asked to review Hill's The Strength of Black Families. A condensed review will be provided).

The lecturette will focus on a definition of values, the importance of values and full discussion should evolve around Black family values. The trainer should illicit responses around foster parent values as related to sexual behavior, money, the role of children and parents, with some attention being given to parental handling of inconsistency of societal democratic values and the treatment of minority groups. The session may be ended by a role play situation depicting a value conflict such as the adolescent's use of money, drugs or sexual behavior.

*Log assignments are not noted hereafter, however, Trainers are responsible for the development of an appropriate log assignment for each session.

Lab/Experiential Activity:

The activity may be a continuation of the issues involved in the role play situation, or a selection of one of the topics from a Values Forum, which will provide for discussion around issuers of Drugs and Medication, Relationships with the Natural Family, Collaborative relationships with the Social Worker, and privacy and discipline.

Behavioral Objectives:

The foster parent will be able to:

(1) Recognize the importance of values clarification in self awareness.

(2) Identify the major source of values in their lives.

(3) Identify their most important personal and parenting values.

(4) Identify those values that have been identified as being unique to Black Families.

Behavioral Changes:

(1) In making parenting decisions, the foster parent will try to determine the influence of their personal values on each decision and to weigh the appropriateness of that influence.

(2) Foster parents will discuss values conflicts more frequently in group, with the adolescent and with the social worker.

SESSION IV

HUMAN GROWTH AND DEVELOPMENT

Separation and Loss

Lecturette:

In the presentation, the trainer will utilize the basic scheme of Eric Erickson's Eight Stages of Man, with a focus upon experiences that result in a positive or faulty resolution of the tasks of each stage. Emphasis will be placed on the life stages of young adulthood and adulthood, identifying the crisis presented and the central problem task to be solved. A correlation may be drawn between the "authenticity crisis" of the adult and resultant reintegration of identity and the adolescent's search for identity.

It is crucial for the foster parent to have an understanding of the concept of separation and loss, and there are a number of theories available. The trainer may use the material of John Bowlby and Carolyn Thomas, was studied grief and mourning in young children separated from their families. The trainer may also make use of the Kubler-Ross material on death and dying.

Lab/Experiential Activity:

(In that this is a full content session in terms of the areas to be covered, time may preclude the group breaking into small group and the lab activity may be conducted in full group).

A Fantasy Trip is one possible means of beginning the process of enabling the foster parent to get in touch with feelings related to separation and loss. The Fantasy Trip may parallel the experience of an adolescent having experienced multiple placements in group homes, diagnostic treatment centers and foster family homes. After completing the activity foster parents should be asked to share feelings that are related to the experience, with the Trainer emphasizing that these are feelings that are universal and are connected with the stages of loss and grieving.

Alternative activities may be to use the experience described by Washington in his autobiography Up From Slavery, of the separation from his family of origin; or foster parents may be asked to think of someone to whom they are very close and have been permanently separated from through death, divorce, desertion, etc., and share the feelings associated with this loss with someone in the group to whom they feel close. Case materials may also be used in the completion of this exercise.

The Trainer should draw parallels to the work with children and families, emphasizing that the comfort with which the foster parent handles own feelings of separation and loss impact on how they are able to recognize and assist the foster child in coping with these feelings.

Behavioral Objectives:

(1) The foster parent will be able to identify his own developmental stage and the main developmental issue and crisis presented.

(2) The foster parent will be able to identify the developmental stages from infancy through adolescence in terms of characteristics and tasks.

(3) The foster parent will be able to identify the current developmental stage of his foster child.

(4) The foster parent will be able to identify at least two indications of faulty resolution of developmental tasks.

(5) The foster parent will be able to identify residual effects of initial feelings of separation and loss of the adolescent in their interactions together.

Behavioral Changes:

(1) The foster parent will relinquish lay theories in seeking causal relationships in behavior and increase in the ability to make assessments of behavior that are based on human development theory.

(2) Foster parents will relate to new placements and termination of placements with a greater degree of sensitivity to the needs of self, the adolescent, and other foster family members.

(In partial fulfillment of the log assignment, the foster parent should record the effects upon foster family members of an adolescent moving into their home or of a placement being terminated.

SESSION V

ADOLESCENT GROWTH AND DEVELOPMENT

Lecturette:

The discussion should approach adolescence as a period of natural turmoil and dysfunctional behavior. The adolescent in foster care is faced with a paradoxical situation with augments this period of turmoil. The process of identity formation is complicated by his foster care and minority group status, and his tasks of achieving autonomy and independence from family ties complicated by his need to make attachments to new and different parenting figures. Emphasis should be given to the special concerns of the minority youngster, his needs for consolidation of a racial identity, and to the characteristic problems presented by the adolescent who is involved in faulty resolution, i.e., sexual promiscuity, pregnancy, substance abuse, poor school and vociational performance.

Lab/Experiential Assignment:

Film: Marsha: In Search of an Identity

The film portrays a sixteen year old who has been remanded to the custody of the court because of her mother's inability to control her behavior. Her experiences in group homes, inability to establish supportive peer relationships and her struggles with sexual identity as she experiments with lesbian relationships are highlighted.

Behavioral Objectives:

(1) The foster parent will be able to identify the major developmental task of adolescence.

(2) The foster parent will be able to identify the special concerns of identity consolidation that are unique to the minority adolescent in foster care.

(3) The foster parent will be able to identify the developmental stage and task in which his foster child is currently involved.

Behavioral Changes:

(1) The foster parent should be able to assess the adolescent's development by using theory that is related to human development.

(2) The foster parent will be able to relate to the developmental needs of the adolescent with a greater degree of sensitivity.

(3) The foster parent will become more supportive in his parenting efforts with a decrease in the need to control the adolescent's behavior.

SESSION VI

ASSESSMENT AND PLANNING

Black Family Life Style

Lecturette:

The presentation will give a historical perspective of the Black family and its evolution as a system that is adaptive and particularly well-suited to rear minority youngsters to survive and achieve in the larger society. There will be a presentation of the theories of Billingsley, Chestang and Hill, with some attention being directed to the dispelling of myths that have been associated with Black family functioning, i.e., desertion by the father, matriarchal family structure and out of wedlock pregnancy. A brief overview of the work of Billingsley and Giovannoni should be presented which documents that services to Black children have been overwhelmingly directed towards the placement of the child away from his own home. A major intent of the

session is to assist the foster parent to value and better understand the foster child's natural family and the adolescent's need to gain a sense of comfort with his origins if he is to enjoy successful functioning in interpersonal and social adult relationships, with full integration of personality.

The session will further support the theme of the contractual agreement in adolescent placement, the foster parent's role of mentor/role model, with the adolescent having a need to be involved in the planning and the decision-making process as it affects his life.

Caring for non-related children has been a tradition within the Black community and that the Black family is a natural unit for providing re-socialization experiences to Black children should be stressed. If feasible, a natural parent who has been reunited with children will give a brief talk to the foster parents. In lieu of this, the publication THE PARENT IN THE SHADOW will be used to facilitate a discussion of the natural parent.

Lab/Experiential Assignment:

The group wil be introduced to the Uniform Case Record and its use in planning and goal achievement review.

The major content areas of the Child Welfare Reform Act should be utilized with focus on foster parent preference act, and procedures for subsidized adoptions.

Behavioral Objectives:

(1) The foster parent will be able to identify at least three myths and stereotypes that have been associated with Black family life functioning.

(2) The foster parent will develop a familiarity with the Uniform Case Record and identify those areas in which he can have planning input.

(3) The foster parent will be able to identify the attributes of role model/mentor.

(4) The foster parent will be able to identify at least two communication interactional skills that would support the maintenance of a contractual agreement.

Behavioral Changes:

(1) The foster parent will demonstrate a greater empathetic connection to the natural parent, and ability to support the adolescent's maintaining appropriate contact and visitation.

(2) The foster parent will demonstrate an increased ability to engage in planful activities with the adolescent.

SESSION VII

BEHAVIOR MANAGEMENT/FOSTER PARENT PRACTICE

This session will bring together all of the learnings of the previous session and will be taught by the Project Director and the co-therapist of the Communication/Interaction Skills Module. From the work of the previous sessions it is anticipated that critical information will have evolved around which the sequence content can be formulated. If feasible, a tape of one session from the C/I training module will be presented in this session. Assisting the foster parent to cope with those most identified problematic behaviors presented by the adolescent will be the major theme of the sequence. Focus will be upon assisting and enabling the foster parent to teach alternative behaviors through role modeling, crisis prevention and mediation, and the use of the techniques of the life space interview. An underlying assumption is that all behavior, including negative behavior, has purpose and meaning for the individual. A goal of teaching alternative behaviors is to assist the adolescent to communicate that meaning in positive, non-self destructive ways.

Lab/Experiential Assignment:

The group may remain together in full session for involvement in at least three role play situations that depict characteristic encounters of foster parent and adolescent. The task of foster parents observing the role play will be to: (1) identify the possible underlying meaning of the behavior of the adolescent and of the foster parent, (2) identify the most appropriate parenting style for coping with the "personality style" of the adolescent, and (3) identify the techniques that were or were not used by the foster parents in teaching new or alternative behaviors and (4) identify those dynamics that may be unique to the minority fostering constellation. The task of the foster parents involved in the role play should be to focus on a discussion of self awareness issues and the conscious use of self in the resolution of conflict and interactions with the adolescent.

Behavioral Objectives:

(1) The foster parent will be able to identify the techniques of life space interviewing.

(2) The foster parent will be able to identify some of the possible underlying causes of at least three of the most identified problematic behaviors.

(3) The foster parent in role play situations will be able to demonstrate appropriate techniques of teaching alternative behaviors.

Behavioral Changes:

(1) The foster parent will more often make conscious use of self in coping with the negative expressions of the adolescent's behavior.

(2) The foster parent will relate to the adolescent with a greater degree of sensitivity and regard.

SESSION VIII

SYSTEMS NEGOTIATION/COPING WITH BURN OUT

Recent changes in child welfare regulations and Special Services to Children assessment requirements now mandate that foster parents be engaged in direct service activities that were once the responsibility of agency staff. Many service delivery systems are unfamiliar and encounters with them are stressful for the foster parent. This sequence will provide the foster parent with information about the structure, purpose and function of the most used service delivery systems and entitlement programs, such as the Board of Education, Committee on Handicap, Hospitals, SSI and Social Security. The importance of preventative medical care will be stressed not only in the service to the adolescent, but also as a means of assisting the foste parent to relate to his own health care. In issues related to minority group use of service delivery systems it has been noted that some ethnic minority groups make use of medical services more often in crisis situations rather than as ongoing preventative care.

The work of foster parenting the troubled adolescent can be very stress-producing. Foster parents must undertake this work within a system that they experience as bureaucratic, constraining and non-supportive and insensitive to their needs. Many foster parents are confronted with survival issues of life and the demands of foster parenting often compounds the stress of their life situations. This sequence will assist the foster parent in the identification of stress, stressors and symptoms of burn out with a goal of assisting them to develop coping, self management skills and means for sensitizing the organization to their needs.

In conducting the sessions it is essential that the trainer create a "safe environment" wherein the foster parent can identify organizational and administrative sources of stress and be given an opportunity to identify all of the sources of stress of their jobs. In the absence of such an atmosphere the session has the potential for adding to stress rather than to its reduction.

The extended family system should be developed into a major support or self help structure.

Behavioral Objectives:

(1) The foster parent will be able to identify at least three major service provider agencies, their function, purpose and structure.

(2) The foster parent will be able to identify the importance of preventative health care.

(3) The foster parent should be able to identify the major stressors of his family life and foster role.

(4) The foster parent will be able to recognize the symptoms of stress and burn out in themselves and in other foster parents.

(5) The foster parent will be able to give examples of stress reducing technqies and ways in which the extended family system can be used as a support, self help system.

(6) The foster parent will be able identify examples of insensitive and inequitable treatment os service delivery systems in their interactions with ethnic minorities.

Behavioral Changes:

(1) The foster parent should demonstrate a greater willingness and ability to utilize service delivery systems on behalf of self and adolescent in their care.

(2) The foster parent should demonstrate an ability to assume a role of advocacy in the identification and use of support service delivery systems on behalf of the adolescent in their care.

COMMUNICATION/INTERACTION SKILLS MODULE

The content of the Communication/Interactional Module cannot be fully explicated here in that much of the content will be developed from the issues that the participants bring to the sessions that come about in their day to day interactions in the home setting.

Focus will be upon communication; the development of skills in negotiating and mediating conflicts with some degree of insight development; the establishment of mutual feelings of empathetic regard; and the establishing of reciprocity in behavioral control and management.

The themes of all sessions of this module will parallel those of the Behavioral/Management Module with the co-trainers directing the interaction of the participants to facilitate the achievement of learning objectives and behavioral changes through the use of the group process.

SESSION I

ORIENTATION

The orientation session will be conducted by the Project Director and the co-trainer. The training objectives will be presented and the responsibilities of trainers and participants. The participants are responsible for completing log assignments for each session; one reading assignment, I Know Why The Caged Bird Sings; attending all group sessions promptly and for relating to one another in an appropriate manner in sessions.

The trainers will allow for input from the participants as to what they would like to gain from the sessions and learn from the experience. The

pre-test will be administered, and partipants will be given the first assignment, which is the completion of the autobiographicalsketch which will be used in Session II.

SESSION II

Self Awareness

FOSTER PARENTING STYLE

Mutual sharing between the foster parent and the adolescent around families of origin.

SESSION III

Self Awareness

VALUES CLARIFICATION

Some exploration of generational conflicts in values, and foster family, family of origin value conflict and similarities.

SESSION IV

HUMAN GROWTH AND BEHAVIOR

Understanding the underlying meaning of behavior, and the initial feelings of separation and loss.

SESSION V

ADOLESCENT GROWTH AND DEVELOPMENT

Developing skills in communication and reflective listening; understanding the adolescent "condition".

SESSION VI

ASSESSMENT AND PLANNING/BLACK FAMILY LIFE STYLE

Discipline, self control and role expectation. The contractual agreement and adolescents' role in planning and goal setting.

SESSION VII

BEHAVIOR MANAGEMENT/FOSTER PARENT PRACTICE

Reflections on independent living, necessary supports and transitions.

SESSION VIII

SYSTEMS NEGOTIATION/COPING WITH BURN OUT

This session will be conducted with the total group of foster parents from both training modules.

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