

ABSTRACTS OF PAPERS

SECTION I

EVOLUTION, SELECTION AND SYSTEMATICS

SYSTEMATICS AND EVOLUTION OF AUSTRALASIAN OYSTERCATCHERS

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The multivariate statistical techniques of cluster analysis and non-metric multi-dimensional scaling were used to analyse variation in thirteen morphological characters of six 'taxa' (OTUs) of Australasian oystercatchers. Both techniques produced four phenetic clusters, suggesting that four species (*Haematopus ostralegus finschi*, *H. chathamensis*, *H. longirostris* and *H. fuliginosus*) should be recognized in Australasia.

The cladistic affinities of these taxa were assessed by constructing a most parsimonious evolutionary tree and the implied evolutionary relationships were interpreted against independent evidence provided by Mallophaga and common dispersal routes. *H. chathamensis* and *H. longirostris* are considered to be New World elements derived from a Pacific Basin group, which diverged early from the Old World European group. *H. ostralegus finschi* has obvious affinities with European *H. ostralegus* and thus must be regarded as an Old World element. Issue is taken with Mayr's suggestion (in Falla 1953) that *H. fuliginosus* may have been derived from a secondary invasion into Australia of melanistic *H. longirostris* from New Zealand. *H. fuliginosus ophthalmicus* of northern Australia has phenetic affinity with *H. moquini* of South Africa.

PHENETICS AND EVOLUTIONARY RATES OF VIREOS (AVES: VIREONIDAE)

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The family Vireonidae comprises about forty-one species restricted to the western hemisphere distributed among three subfamilies (Vireoninae 36, Cyclarhinae 2, Vireolaninae 3). Phenetic studies involving multivariate statistical assessment of mensural skeletal characters indicate that the peppershrikes *Cyclarhis* and the shrikevireos *Vireolanius* are clearly members of the family Vireonidae but separate from the true vireos (Vireoninae) at the subfamilial level.

Within the Vireoninae the genera *Neochloe*, *Hylophilus* and *Vireo* traditionally have been recognized. In turn the genus *Vireo* has comprised the subgenera *Lanivireo*, *Vireo* and *Vireosylva*. Principal components and cluster analyses indicate that *Neochloe* is close phenetically to the White-eyed Vireo *Vireo griseus* and belongs in the subgenus *Vireo*; that *Lanivireo* (*V. solitarius* and *V. flavifrons*) should be enlarged to include *Vireo vicinior*, *V. osburni* and *V. huttoni* (heretofore regarded as closely allied to *V. griseus*); and *Vireo hypochryseus* previously thought to belong to the subgenus *Vireo* is shown to be a member of the subgenus *Vireosylva*. Finally the potential intergradation between *Vireo atricapillus* and *V. nanus* in northern Mexico supported by myological and vocal data is suggested. Ecological, behavioural and morphological data supporting phenetic results are reviewed in brief, as are evolutionary rates and problems of geographical variation in the family.

AVIAN ANATOMICAL NOMENCLATURE

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The International Committee on Avian Anatomical Nomenclature (ICAAAN) came into existence in Mexico City in 1971. Previously the nucleus of the present Committee was a subcommittee of the International Committee on Veterinary Anatomical Nomenclature. The goal of ICAAN is the formulation of an internationally acceptable, standardized terminology of the anatomical parts of birds assembled by scientists who throughout the world represent a broad range of research in avian biology. This nomenclature will be of value in clarifying and facilitating all aspects of communication among avian biologists, particularly in publication, storage and retrieval of scientific information.

To date the major accomplishments of ICAAN have included: initial organization and expansion of the Committee to its present seventy members; development of first Draft Lists and secondary Provisional Lists of terms and accompanying illustrations that encompass all regions and systems of the body. These activities have been conducted largely by correspondence between members; two general meetings have been held in USA (1973) and in England (1974). Definitive lists of terms and illustrations will be published in 1975 as the first edition of *Nomina Anatomica Avium*, which will be presented at the meeting of the World Association of Veterinary Anatomists in Greece and subsequently made available for distribution.

THE EVOLUTION OF THE PETRELS

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The Procellariiformes represent the extreme form of adaptation to a marine environment now found in birds, including a wider range of types and more extensive distribution than in any other group. They may first have evolved in the open predator-free seas of the southern hemisphere because their prolonged stereotyped life and reproductive cycles are less suited to the north, but they must soon have dispersed widely, perhaps as migrants, notably into the great northern Tethys Ocean of the Tertiary. Some types such as the albatrosses, fulmars, some shearwaters, the southern storm-petrels and diving-petrels may have persisted unchanged for long periods, but others, such as the prions, gadfly-petrels, some shearwaters and the northern storm-petrels, still appear to be actively evolving. The main factors controlling their distribution and evolution appear to be the movements of water-masses with fluctuations in climate in relation to transient island breeding-stations and land-barriers between continents, which sometimes promote colonization from one water-mass to another and sometimes prevent it, movements back and forth across the equator also playing an important role.

PTERYLOGRAPHY OF THE MENURAE: TAXONOMIC CONSIDERATIONS

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This paper offers detailed descriptions and comparisons of the tracts of body feathers of lyrebirds *Menura*, hitherto known only poorly, and scrub-birds *Atrichornis*, never before studied. Like many other aspects of the anatomy of these anomalous passerines, the two pteryloses show similarities and strong dissimilarities to one another and to those of other perching birds. A general review of the soft and hard anatomy of the Menurae is presented. The contributions of this pterylographical study and others recently completed allow a reassessment of the taxonomic position of the suborder, which will be discussed.

SPECIFIC LIMITS OF THE GULLS OF THE *LARUS CANUS*- *LARUS DELAWARENSIS* GROUP

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As an illustration of the possibilities offered by the study of immature stages in the understanding of relationships among gulls *Larus* an analysis of the holarctic *canus-kamtschatschensis-brachyrhynchus-delawarensis* complex is presented. The first three forms have traditionally been regarded as closely allied races of a single species, *Larus canus*, and the fourth is a very distinct, if related, species, *Larus delawarensis*. However, a recent analysis of the group, based mostly on adult characters and measurements, resulted in a division of the complex into three species, *canus*, *delawarensis* and *kamtschatschensis*, the latter being considered as more similar to *delawarensis* than to *canus*.

The present investigation, undertaken as part of a survey of the genus, focusing on the rather conservative and numerous characters of immature plumages, unequivocally confirms the older arrangement. Patterns of individual feathers of the three races of *canus* are practically identical and very different from those of *delawarensis*. No character has been found that would set *kamtschatschensis* apart from the species *canus*, particularly from its race *brachyrhynchus*. The method also provides some insight into the phylogeny of the group and its relationships with other 'typical large white-headed gulls' of Moynihan's classification.

PATTERNS OF SPECIATION AND COMPETITION IN AFRICAN MONTANE BIRDS

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African mountains are divided into groups on the basis of their stenotopic montane bird faunas: the Cameroon, Abyssinian, East Congo, Kenyan, Nyasan, and South-eastern and Angolan groups. Their boundaries are formed by extensive lowlands now unsuitable for the dispersal of montane endemics, often dry rift-valleys. These barriers have existed since the last glaciation, some 18,000 years ago. Barriers between individual mountains have developed more recently, a process accelerated by degradation and destruction of habitat. Much of the woodland separating central African montane forests is structurally acceptable to forest birds when protected from fire for a long time.

Moreau considered endemism in African montane birds to have isolation as an important factor, but admitted some anomalies. The major factor affecting speciation in montane areas is competition between sympatric species, including lowland elements. Analyses of the African montane bird faunas show that speciation and endemism are usually greatest where there is most competition between related species. Competition can be a contributory factor in local extermination of a species brought about by diminution of habitat. A few endemics have no close relatives and are relicts. Conversely, a species receiving little competition from congeners is usually successful, uniform morphologically and tolerant of a large range of conditions. Subspeciation caused by local environmental factors is much less common than might be expected in a series of isolated populations. The widespread distribution of several otherwise montane species in southern Africa is primarily the result of only slight intra-generic competition in lowland areas during past periods of higher rainfall.

LOWER TERTIARY BIRDS AND THEIR RELATIONSHIP TO EXISTING TAXA

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A study of the Eocene bird fauna of Britain has revealed further evidence of forms referable to Recent taxa. Further preparation of previously described specimens has revealed a more complex situation than was otherwise thought. Two taxa, one consisting of a single specimen, the other a species-group, show a mixture of characters, some unique, but the others apparently referable to more than one Recent order.

The single specimen, *Prophaethon shrubsolei*, shows a number of characters typical of the Pelecaniformes, but also a significant proportion that, in aggregate, are typical of the Charadriiformes. The species-group is that of the bony-toothed birds, Odontopterygiformes, which show characters referable to the Pelecaniformes and the Procellariiformes. An assumption that these must be fitted into the Holocene taxonomic system would result in an extension of the characters of one order to include many of those typical of another.

The Eocene pattern apparent at present is that of a wide array of families sharing a few characters with nearby families. There is no evidence of the ordinal divisions from which these families might be derived. *Prophaethon* and the bony-toothed birds fit into this array of families and it is only when these became extinct that the more discrete divisions into the orders recognized in the Holocene became possible.

THE EVOLUTION OF SOCIAL BEHAVIOUR AND THE TAXONOMIC RELATIONSHIP OF SOLITARY AND YELLOW-THROATED VIREOS

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Vireo s. solitarius and *V. flavifrons* use a series of similar sounding or appearing vocal and non-vocal displays in identical situations. Some of these or parts of them, including a ritualized nest-building display, are apparently unique among vireos. Between these two species the most noticeable differences appear in those behaviours that function to isolate species, principally primary song and pre-copulatory displays. *V. flavifrons* has apparently retained non-essential behavioural patterns and evolved new components of display.

A possible hybrid individual, *V. flavifrons* singing the song of *V. s. solitarius*, was discovered and its song sonographically compared to those of both species. The taxonomic implications of such possible hybrids, the general similarity of behaviour between the two species and the extent of polymorphism in *V. solitarius* all support the postulated evolution of *V. flavifrons* from *V. solitarius* stock.

CONTINENTAL DRIFT AND THE ORIGINS OF THE MADAGASCAN AVIFAUNA

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Previous authors have discussed the origins of the Madagascan avifauna from a viewpoint of stable continents. These problems must now be reconsidered, to take into account new ideas about the behaviour of the earth's surface. A brief summary is

presented of the various interpretations of the palaeogeography of the Indian Ocean. It seems clear that Africa, Madagascar and India were once united as part of Gondwanaland. They probably did not begin to drift apart until as recently as the late Cretaceous or early Cainozoic. If Madagascar was thus joined to other land masses for 60 to 70 million years after the appearance of *Archaeopteryx*, it can surely be supposed to have had some kind of avifauna when it finally became detached. Five living orders and three living families with present-day representatives in Madagascar are known from the Cretaceous and by the end of the Eocene there are thirteen orders and sixteen families. Many Madagascan representatives of these ancient orders and families are seemingly recent invaders, being weakly differentiated from their relatives in Africa or Asia but others are of much older lineage. The Aepyornithiformes may have already been flightless when Madagascar became detached and simply remained there. It is no longer necessary to assume that they flew there and later became flightless. The ancestors of the five families endemic to Madagascar may also have been present on the island at the time of its isolation. Continental drift can thus be supposed to have played some part in the early history of the Madagascan avifauna.

PROCESSES OF SELECTION IN THE POPULATION OF ZOSTEROPS ON A CORAL-CAY ISLAND

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An isolated population of *Zosterops lateralis chlorocephala* has been studied on Heron Island (16 hectares), Great Barrier Reef. Since 1965 about 2,800 birds have been individually colour-banded and their agonistic encounters at feeding stations recorded in winter, when figs constituted their major food on the island. Except in 1967 and 1971 when cyclones reduced the post-breeding populations considerably, there was a tendency for dominant birds to survive better than subordinate birds during winter. The size of population at the breeding season varied between 200 and 450 adults and in years of high density many first-year birds, particularly submissive ones, did not breed. Breeding was triggered by the spring rain and the laying of the first clutch occurred between August and November. More than 95 per cent of each generation surviving to the next breeding season has been banded since 1966 and their breeding success has been measured since the 1969-70 season. Significantly more pairs with high dominance nested in more crowded conditions in an environment apparently rich in food. The dominance status of independent young was significantly related to that of the parents and selection of certain agonistic behavioural patterns is paralleled with increased size of body and bill, and length of tarsus in the island race. The large size may have been selected for in the years of high density during periods without natural disasters.

NEW FOSSIL EVIDENCE OF THE ORIGIN OF FRIGATEBIRDS

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Today the five closely related species of frigatebirds (Fregatidae) are entirely marine forms that are highly adapted for prolonged soaring and for feeding from the surface of the ocean. They have long wings, greatly reduced legs and feet, a long forked tail and highly pneumatic skeletons with much fusion in the bones of the pectoral girdle. Although the frigatebirds have almost always been included in the order Pelecaniformes, they are generally considered as forming an aberrant group that has no obvious ties with other pelecaniform birds and at times it has even been suggested that they might be more closely related to taxa outside the Pelecaniformes. Apart from sub-fossil

material of recent species from islands in the South Atlantic, no fossil frigatebirds have been recognized and nothing of their origins was known.

This situation has now changed with the discovery of a remarkably well-preserved skeleton, including feather impressions, of a primitive frigatebird from the Lower Eocene (Green River Formation) of Wyoming. The size of body of this bird was roughly the same as that of the Lesser Frigatebird *Fregata ariel* but the wings were shorter and the legs, feet and toes better developed. There was no fusion in the pectoral girdle and none of the bones shows any indication of having been pneumatic. The conformation of the bill and tarso-metatarsus show definite resemblances to the Sulidae, suggesting that boobies and frigatebirds had a common ancestor in the Cretaceous or Palaeocene. The fossil frigatebird was much less specialized than the modern forms, but there is nothing in its structure that would preclude its being directly ancestral to *Fregata*. It may have been gull-like or skua-like in its habits and was probably better able to land and feed in the water or on shore than its modern derivatives. The deposits in which it was found were formed in the bed of a large saline inland lake, indicating that the frigatebirds were not entirely marine in origin and that the ancestral forms probably occupied a wider range of habitats than does *Fregata*.

THE INCREDIBLE AMERICAN RED CROSSBILL LOXIA CURVIROSTRA, CARDUELINAE

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Why are Red Crossbills 'incredible'? Because, though all races are similar in voice and biology (breeding, plumages) so far as known, they may have widely overlapping regular ranges with apparently little cross-breeding. What isolation they do show is more ecological than geographical; some races are extraordinarily vagrant, often crossing the continent, yet the species is divided into several well-marked subspecies, some of them practically sedentary. Racial differences, though not adequately described in terms of coloration or traditional measurements, extend to the skeleton, which varies with both race and sex. They may nest at any season, but chiefly in winter and sometimes on the other side of the continent from their usual home range or at a tender age. Their sequence of plumages follows no regular rule, and we cannot even discuss them intelligibly, using the convenience of names, if we hold too rigidly to arbitrary taxonomic standards! In general the species violates all our rules, starting with Bergmann's. It has, inevitably, been badly misunderstood. Stubborn refusal of ornithologists to face the facts of discoloration and abandon their preconceptions, plus lack of *continuous collecting*, has completely concealed a very serious problem of conservation! Incredible, indeed.

TAXONOMIC STUDIES ON THE SWIFTLETS OF THE GENUS COLLOCALIA GRAY, 1840

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It is more than 300 years since Worm and Bontius described and figured the bird and the nest of swiftlets, which are now known as belonging to the genus *Collocalia*. Since then more than forty species have been described, and more than 100 subspecies have been confused taxonomically and consequently often transferred from one species to another or even to other genera. This is because most species possess closely similar morphological characters, such as colour patterns of the feathers, slight differences of

tarsal feathering, measurements of the wing, tail, bill and feet. It is very surprising that only four species, namely *Collocalia gigas* Hartert and Butler, *C. fuciphaga* (Thunberg), *C. troglodytes* Gray and *C. esculenta* (Linnaeus) are commonly agreed upon by previous workers such as Oberholser, Stresemann, Mayr, Peters and Medway.

The classification of the 'grey' swiftlets still poses a problem and is up to now unsettled. More field observations and longer series of museum specimens are badly needed. The ability to utter the rattle-call, the quality of the twitter-call and their careful correlation with morphological characters might help in assigning the 'grey' swiftlets to their proper taxon. By using museum specimens only, it is possible to separate the 'glossy' swiftlet into four groups.

ANSER INDICUS OR EULABEIA INDICA—A CONTRIBUTION TO THE SYSTEMATICS OF THE GENERA ANSER AND BRANTA

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In 1945 Delacour and Mayr lumped the Bar-headed Goose *Eulabeia*, snow geese *Chen*, Emperor Goose *Phalacrocorax* and Swan Goose *Cygnopsis* with *Anser* species (Grey-lag Goose, White-fronted, etc.). I would like to discuss the systematic position of the Bar-headed Goose with regard to ethological, morphological, physiological and parasitological results.

Some ethological patterns that occur in *Anser* and *Branta* species are missing in the Bar-headed Goose, for instance the so-called egg-rolling; other behavioural patterns are quite different, e.g. the postcopulatory display; some patterns have a signalling character only in the Bar-headed Goose. The colour of plumage of adult and young Geese, the proportions of head, body and wings, as well as allometric correlation during growth, will be discussed. The composition of substances indicating relationships among the above species, as reflected by the egg-white proteins and the constituents of the rump gland, will be shown. Finally, the susceptibility to disease and parasites will be given.