

STOMACH ANALYSES OF SOME TAIWAN BIRDS

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ABSTRACT

The stomach contents of 238 specimens representing 65 species of birds are analysed. Most birds were collected between March-May in the years of 1959 and 1960 in central Taiwan and along the east coast.

The staff of the U.S. Naval Medical Research Unit No. 2 in Taipei, Taiwan has in recent years taken an active part in investigations in the biology of Taiwan. Extensive collections of biological material have been taken on Taiwan and its offshore islands as a part of biomedical and epidemiological studies. Considerable attention has been directed toward a systematic collection of the lower vertebrates to determine the extent to which they serve as carriers or as hosts for the viral, rickettsial and parasitic diseases of man. A number of biological studies have been completed as by-products of the overall field studies by the U.S. Navy.

The present report is based upon a study of the stomach contents obtained from representative birds obtained by the author as a guest investigator during the course of field studies at the Parasitology Department of NAMRU No. 2.

MATERIALS AND METHODS

Analyses were made of the stomach contents of 238 specimens representing 65 species of birds. The majority of birds was collected in the highlands (1060 to 1820 m) of central Taiwan in the vicinity of Wu-sheh, Nan-tou Hsien from April 15 to May 14, 1959 and in the mountainous and coastal areas near Hua-lien, Hua-lien Hsien

along the east coast, from March 22 to April 10, 1960. A few specimens were taken also along the highways between Taipei and the above localities as well as near the city of Chia-yi, and in the mountains near Fen-chi-hu and Ali-shan in Chia-yi Hsien. Bird specimens were taken between sea level and an elevation of approximately 6000 feet.

Stomach contents were dried and placed in empty match boxes and/or larger paper containers and stored until time of examination, approximately 2-3 years later. Analyses were made by Dr. Toyosu Wada of Kochi University, Shikoku, Japan. Skins of nearly all birds taken were preserved and have been deposited in the U.S. National Museum, Washington, D. C. and in the Museum of Vertebrate Zoology, University of California, Berkeley, California.

RESULTS

A list of birds taken and stomach contents is given below. Since stomach examination were based entirely on dried materials, no attempt was made to conduct quantitative analyses.

The nomenclature and sequence of birds listed is based on Ripley's *Synopsis of the Birds of India and Pakistan* (1).

LIST OF BIRDS TAKEN AND STOMACH CONTENTS

Birds	Insects	Stomach contents
<i>Bubulcus ibis</i> (1)*	Odonata	

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* Number of birds examined.

Birds	Stomach contents
	Orthoptera <i>Gryllacridae</i> (<i>Loxoblemmus arietulus</i>) <i>Gryllidae</i> (<i>Gryllulus mitratus</i>) <i>Locustidae</i> Insect larvae (Orthoptera) <i>Gryllotalpidae</i> (<i>Gryllotalpa africana</i>)
<i>Ixobrychus cinnamomeus</i> (1)	Fish Insect larvae (Odonata)
<i>Arborophila crudigularis</i> (1)	Seeds (unidentified) Grit
<i>Lophura swinhoii</i> (1)	Insects (unidentified) Insect larvae (Lepidoptera) Seeds <i>Leguminosae</i> (<i>Wistaria brachybotrys</i>) <i>Rosaceae</i> (<i>Prunus</i> sp.) Grit
<i>Phasianus colchicus</i> (2)	Seeds (<i>Gramineae</i>) (1)** Grit (2)
<i>Turnix suscitator</i> (1)	Seeds (<i>Gramineae</i> and <i>Leguminosae</i>) Grit
<i>Columba pulchricollis</i> (2)	Seeds (2) <i>Lauraceae</i> (<i>Machilus thunbergii</i>) (1) Unidentified (1) Grit (1)
<i>Centropus bengalensis</i> (2)	Reptiles (<i>Japarula swinhonis</i>) Insects (1) Orthoptera (<i>Locustidae</i>) (1) Seeds (2) <i>Menispermaceae</i> (<i>Cocculus trilobus</i>) (1) <i>Rosaceae</i> (<i>Rubus</i> sp.) (1) Unidentified (2)
<i>Otus bakkamoena</i> (2)	Feathers (unidentified small bird) (1) Insects (1) Orthoptera (1) <i>Locustidae</i> (1) <i>Tettigoniidae</i> (<i>Mecapoda elongata</i>) (1) Unidentified (1)
<i>Caprimulgus affinis</i> (1)	Insects (Coleoptera) Grit
<i>Apus pacificus</i> (2)	Insects (2) Coleoptera (2) <i>Cerambycidae</i> (1) <i>Coccinellidae</i> (1) <i>Scarabeidae</i> (1) Unidentified (1) Diptera (1) Hemiptera (<i>Pentatonidae</i>) (1)
<i>Apus affinis</i> (1)	Insects (Coleoptera)

** Number of stomachs in which material was found.

Birds	Stomach contents
<i>Cyanops nuchalis</i> (2)	Insects (Coleoptera) (1) Seeds (<i>Lauraceae</i>) (1)
<i>Alauda gulgula</i> (5)	Insects (3) Coleoptera (2) <i>Scarabeidae</i> (1) Unidentified (2) Seeds (3) <i>Cyperaceae</i> (1) Unidentified (2) Grit (4)
<i>Hirundo rustica</i> (4)	Insects (4) Coleoptera (2) Hymenoptera (<i>Formicidae</i>) (1) Unidentified (1)
<i>Hirundo tahitica</i> (1)	Insects (Coleoptera) Grit
<i>Lanius schach</i> (9)	Feathers (unidentified small bird) (1) Insects (9) Coleoptera (7) <i>Rhomborrhina unicolor</i> (1) Unidentified (6) Hemiptera (1) Odonata (1) Orthoptera (<i>Locustidae</i>) (1) Grit (1)
<i>Dicrurus macrocercus</i> (6)	Insects (6) Coleoptera (5) Hemiptera (1) Hymenoptera (1) Odonata (2) Orthoptera (1)
<i>Garrulus glandarius</i> (5)	Small mammals (unidentified) (2) Insects (5) Coleoptera (5) <i>Rhomborrhina unicolor</i> (5) Unidentified (3) Spiders (1) Grit (2)
<i>Nucifraga caryocatactes</i> (1)	Insects Coleoptera <i>Rhomborrhina unicolor</i> Unidentified Hymenoptera (<i>Vespula lewisi</i>)
<i>Pericrocotus solaris</i> (2)	Insects (2) Coleoptera (2) Unidentified (1) Insect larvae (Lepidoptera) (2)
<i>Spizixos semitorques</i> (2)	Insects (2) Coleoptera (2) Insect larvae (Lepidoptera) (1)

Birds

Stomach contents

	Seeds (2)
	<i>Rosaceae</i> (<i>Prunus</i> sp.) (1)
	Unidentified (1)
<i>Pycnonotus sinensis</i> (6)	Insects (2)
	Coleoptera (2)
	<i>Scarabeidae</i> (1)
	Unidentified (1)
	Seeds (5)
	<i>Lauraceae</i> (1)
	<i>Rosaceae</i> (2)
	<i>Prunus</i> sp. (1)
	<i>Rubus</i> sp. (1)
	Unidentified (2)
<i>Pycnonotus taiwanus</i> (7)	Insects (2)
	Coleoptera (2)
	<i>Chrysomelidae</i> (1)
	<i>Curculionidae</i> (1)
	Unidentified (1)
	Seeds (4)
	<i>Rosaceae</i> (<i>Fragaria</i> sp.) (1)
	<i>Rutaceae</i> (<i>Orixa japonica</i>) (1)
	Unidentified (3)
	Other vegetable matter (unidentified) (1)
	Grit (1)
<i>Hypsipetes madagascariensis</i> (3)	Insects (Coleoptera) (1)
	Insect larvae (Lepidoptera) (1)
	Seeds (2)
	<i>Moraceae</i> (<i>Morus bombycis</i>) (1)
	<i>Rosaceae</i> (<i>Fragaria</i> sp.) (1)
<i>Pomatorhinus ruficollis</i> (5)	Insects (5)
	Coleoptera (4)
	<i>Curculionidae</i> (1)
	Unidentified (3)
	Orthoptera (1)
	Seeds (4)
	<i>Moraceae</i> (<i>Morus bombycis</i>) (2)
	<i>Solonaceae</i> (<i>Tubocapsicum anomalum</i>) (1)
	Unidentified (2)
<i>Pomatorhinus erythrogeus</i> (1)	Insects (Coleoptera) (<i>Scarabeidae</i>)
	Seeds (<i>Moraceae</i>) (<i>Morus bombycis</i>)
<i>Paradoxornis webbiana</i> (5)	Insects (3)
	Coleoptera (2)
	Unidentified (1)
	Seeds (2)
	<i>Rosaceae</i> (<i>Rubus</i> sp.) (2)
	Unidentified (1)
	Sarcocarp (unidentified) (1)
<i>Paradoxornis gularis</i> (1)	Vegetable matter (unidentified)
<i>Garrulax affinis</i> (6)	Insects (5)
	Coleoptera (3)

Birds	Stomach contents
	<ul style="list-style-type: none"> <i>Curculionidae</i> (1) Diptera (1) Unidentified (2) Insect larvae (4) Diptera (1) Lepidoptera (2) Neuroptera (<i>Phryganeidae</i>) (1) Seeds (2) <i>Rosaceae</i> (<i>Rubus</i> sp.) (1) Unidentified (1) Grit (1)
<i>Garrulax poecilorhynchus</i> (9)	<ul style="list-style-type: none"> Insects (8) Coleoptera (7) Unidentified (1) Insect larvae (3) Diptera (1) Lepidoptera (1) Neuroptera (<i>Hagenomyia micans</i>) (1) Seeds (6) <i>Moraceae</i> (<i>Morus bombycis</i>) (3) <i>Rosaceae</i> (<i>Prunus</i> sp.) (2) Unidentified (4) Grit (4)
<i>Liocichla steeri</i> (24)	<ul style="list-style-type: none"> Feathers (unidentified small bird) (1) Insects (18) Coleoptera (14) <i>Buprestidae</i> (1) <i>Cerambycidae</i> (<i>Cyrtoclytus caproides</i>) (1) <i>Coccinellidae</i> (<i>Propylaea japonica</i>) (1) <i>Curculionidae</i> (1) <i>Elatерidae</i> (1) Unidentified (10) Muscoidea (<i>Sarcophagidae</i>) (1) Unidentified (5) Insect larvae (5) Diptera (<i>Tabanidae</i>) (1) Lepidoptera (3) Unidentified (1) Seeds (7) <i>Anacardiaceae</i> (3) <i>Moraceae</i> (<i>Morus bombycis</i>) (2) <i>Polygonaceae</i> (2) <i>Rosaceae</i> (7) <i>Fragaria</i> sp. (1) <i>Rosa</i> sp. (1) <i>Rubus</i> sp. (4) Unidentified (1) Grit (2)
<i>Actinodura morrisonia</i> (1)	<ul style="list-style-type: none"> Insects Coleoptera <i>Carabidae</i> Unidentified Insect larvae (unidentified)

Birds	Stomach contents
	Seeds (unidentified)
<i>Yuhina brunneiceps</i> (11)	Insects (7) Coleoptera (3) Unidentified (4) Insect larvae (2) Lepidoptera (1) Unidentified (1) Seeds (5) <i>Anacardiaceae</i> (2) <i>Rhus ambigua</i> (1) Unidentified (1) <i>Caprifoliaceae</i> (<i>Viburnum dilatatum</i>) (1) Other vegetable matter (unidentified) (1)
<i>Alcippe cinereiceps</i> (6)	Insects (6) Coleoptera (4) Unidentified (2) Seeds (unidentified) (1)
<i>Alcippe brunnea</i> (1)	Insects (Coleoptera) Grit
<i>Alcippe morrisonia</i> (12)	Insects (12) Coleoptera (5) <i>Scarabeidae</i> (1) Unidentified (7) Unidentified (6) Insect larvae (unidentified) (1) Seeds (5) <i>Anacardiaceae</i> (2) <i>Rhus orientalis</i> (1) Unidentified (1) <i>Moraceae</i> (<i>Morus bombycis</i>) (2) <i>Rosaceae</i> (<i>Fragaria</i> sp.) (1) Unidentified (1)
<i>Heterophasia auricularis</i> (7)	Insects (3) Coleoptera (<i>Coccinellidae</i>) (1) Diptera (<i>Tabanidae</i>) (1) Hymenoptera (2) Insect larvae (Lepidoptera) (1) Seeds (6) <i>Lauraceae</i> (1) <i>Rosaceae</i> (2) <i>Rubus</i> sp. (1) Unidentified (1) <i>Solanaceae</i> (1) Unidentified (3)
<i>Muscicapa ferruginea</i> (5)	Insects (5) Coleoptera (3) <i>Staphylinidae</i> (1) Unidentified (2) Hymenoptera (1) Unidentified (2) Insect larvae (Lepidoptera) (1)

Birds	Stomach contents
<i>Muscicapa vivida</i> (3)	Insects (3) Coleoptera (2) Unidentified (1) Insect larvae (Lepidoptera) (1)
<i>Cettia canturians</i> (1)	Insects (Coleoptera and Hemiptera)
<i>Cettia acanthizoides</i> (3)	Insects (3) Coleoptera (2) Unidentified (1)
<i>Bradypterus luteoventris</i> (1)	Insects (unidentified) Spiders (unidentified)
<i>Abroscopus albogularis</i> (4)	Insects (4) Coleoptera (1) Neuroptera (1) Unidentified (2)
<i>Regulus ignicapillus</i> (5)	Insects (5) Coleoptera (1) Diptera (2) Unidentified (2) Insect larvae (Lepidoptera) (1)
<i>Erithacus calliope</i> (2)	Insects (2) Coleoptera (1) Unidentified (1) Seeds (2) <i>Moraceae</i> (<i>Morus bombycis</i>) (1) Unidentified (1)
<i>Erithacus indicus</i> (3)	Insects (3) Coleoptera (1) Unidentified (2)
<i>Erithacus johnstoniae</i> (2)	Insects (2) Coleoptera (1) Unidentified (1) Insect larvae (unidentified) (1)
<i>Rhyacornis fuliginosus</i> (2)	Insects (2) Odonata (1) Unidentified (2)
<i>Cinclidium leucurum</i> (7)	Insects (5) Coleoptera (4) <i>Cerambycidae</i> (1) Unidentified (3) Insect larvae (3) Coleoptera (<i>Cerambycidae</i>) (1) Lepidoptera (1) Orthoptera (1) Seeds (unidentified) (1) Grit (1)
<i>Monticola solitarius</i> (3)	Insects (3) Coleoptera (2) Orthoptera (2) Seeds (3)

Birds

Stomach contents

	<i>Rosaceae</i> (<i>Fragaria</i> sp.) (2)
	Unidentified (1)
	Grit (1)
<i>Turdus pallidus</i> (1)	Seeds
	<i>Celastraceae</i> (<i>Celastrus orbiculatus</i>)
<i>Turdus chrysolaus</i> (4)	Insects (2)
	Coleoptera (1)
	Unidentified (1)
	Seeds (4)
	<i>Rosaceae</i> (<i>Fragaria</i> sp.) (1)
	<i>Solanaceae</i> (<i>Tubocapsicum anomalum</i>) (2)
	Unidentified (1)
	Grit (1)
<i>Parus monticolus</i> (5)	Insects (unidentified) (4)
	Insect larvae (3)
	Lepidoptera (1)
	Unidentified (1)
	Seeds (unidentified) (1)
<i>Parus ater</i> (1)	Insects (unidentified)
<i>Anthus hodgsoni</i> (2)	Insects (Coleoptera) (1)
	Seeds (Cyperaceae) (1)
	Grit (1)
<i>Anthus cervinus</i> (1)	Insects (Coleoptera) (<i>Scarabeidae</i>)
<i>Motacilla flava</i> (1)	Insects (Coleoptera)
<i>Motacilla alba</i> (4)	Insects (3)
	Coleoptera (1)
	Unidentified (2)
	Insect larvae (2)
	Orthoptera (1)
	Unidentified (1)
<i>Zosterops japonica</i> (5)	Insects (4)
	Coleoptera (2)
	<i>Staphylinidae</i> (1)
	<i>Chrysomelidae</i> (1)
	Unidentified (1)
	Unidentified (2)
	Seeds (1)
	<i>Rosaceae</i> (<i>Prunus</i> sp.) (1)
	Unidentified (1)
<i>Passer montanus</i> (3)	Insects (unidentified) (1)
	Insect larvae (Diptera) (1)
	Seeds (unidentified) (1)
	Other vegetable matter (unidentified) (1)
	Grit (3)
<i>Passer rutilans</i> (1)	Seeds (unidentified)
<i>Lonchura striata</i> (1)	Seeds (unidentified)
<i>Carpodacus vinaceus</i> (4)	Insects (3)
	Coleoptera (1)

Birds

Stomach contents

	Unidentified (1)
	Insect larvae (Lepidoptera) (1)
	Seeds (2)
	<i>Rosaceae</i> (<i>Prunus</i> sp.) (1)
	Unidentified (1)
	Grit (3)
<i>Emberiza spodocephala</i> (5)	Insects (unidentified) (1)
	Seeds (5)
	<i>Rosaceae</i> (<i>Rubus</i> sp.) (5)
	Unidentified (4)
	Grit (3)

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REFERENCE

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