

## THE AUSTRALIAN AGROMYZIDAE

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### SYNOPSIS

The known Australian Agromyzidae have been revised, 24 new species are described and keys are given to genera and species in the 10 genera now known to be represented in Australia. The origin of the 57 species is discussed. No evidence is so far available of any close relationship with South American species and it is concluded that the Australian Agromyzidae have arrived from the north, in at least three distinct waves, the earliest possibly being in the Cretaceous.

### INTRODUCTION

The Australian Agromyzidae have hitherto been largely unknown, with a total only of 21 species recorded (Malloch, 1923, 1925, 1927; Hering, 1951, 1962; Kleinschmidt, 1960). This excludes *Fergusonina* spp. which Malloch (1924) and Tonnoir (1937) included in this family, although they are aberrant in a number of features from currently accepted concepts of the Agromyzidae. Hennig (1958) has now raised this group to family rank.

During a month's visit to Australia in January-February, 1961, I was able to make brief collecting trips around Darwin, Brisbane, Sydney, Canberra, Melbourne, Adelaide and in Tasmania and have also been able to study unidentified material from the Australian Museum, Sydney, the Institute of Hygiene and Tropical Medicine, Sydney, the C.S.I.R.O., Canberra, and the Commonwealth Institute of Entomology, London. I was able to examine in Sydney the types of 7 of the 8 Australian species described by Malloch.

In the present paper 57 species are discussed, of which 24 are described as new. Seventeen of the species now recorded for Australia are known from the Oriental region. The biology is known in 30 species and of these 22 are leaf-miners, the others being internal stem-borers (5), gall-causers (2) or seed-feeders (1). No new genus has been discovered. A number of *Melanagromyza* spp. were found, feeding as leaf-miners and pupating in the leaf. The mine in these species is not epidermal but deeper, either upper or lower surface. No other species of this genus are known to feed in this way.

Only 10 genera out of the world total of 22 are represented. All Australian genera occur in the Oriental region, which has only a single additional genus, *Phytagromyza* Hendel, not present in Australia. The close similarity of the generic distribution in Australia and the Oriental region is shown in the following table:—

	Australia		Oriental Region	
	Species	Percentage	Species	Percentage
<i>Agromyza</i> Fall .....	1	1.75	13	16
<i>Japanagromyza</i> Sasakawa .....	1	1.75	3	4
<i>Melanagromyza</i> Hend. ....	24	42.1	28	35
<i>Ophiomyia</i> Brasch .....	6	10.5	4	5
<i>Cerodontha</i> Pz. ....	3	5.3	1	1
<i>Phytobia</i> Lioy .....	7	12.3	15	19
<i>Liriomyza</i> Mik .....	9	15.8	6	8
<i>Phytoliriomyza</i> Hend. ....	1	1.75	1	1
<i>Phytagromyza</i> Hend. ....	—	—	1	1
<i>Pseudonapomyza</i> Hend. ....	1	1.75	4	5
<i>Phytomyza</i> Fall.....	4	7	4	5
	—	—	—	—
	57		80	

My own observations made in January-February—admittedly not the best collecting season—suggest that the Agromyzidae are widespread in Australia but not abundant, as, for instance, in Western Europe or parts of South America. It is incorrect, as Paramonov (1959: 175) suggests, that many leaf-mining species of *Agromyza* and *Phytomyza* remain to be discovered. Certainly many new species do still await discovery, but there is no reason to believe they will not be found approximately in the proportions of the species now known, with a continuing dominance of *Melanagromyza*. In two days' collecting in Tasmania, on Mount Wellington and in the Mt. Field National Park, I was only able to discover two species.

The main genera of the Agromyzidae have recently been characterized in detail by Frick (1952), and it is not proposed to recapitulate generic characters here, apart from those given in the key to genera. The scale line of the drawings represents 0.1 mm. for genitalia and pupal spiracles and 0.5 mm. in other cases, except where otherwise indicated. The following abbreviations have been used:—

ors—upper fronto-orbital bristle(s). acr—acrostichals.  
ori—lower fronto-orbital bristle(s). dc—dorso central bristle(s).

The dc are numbered forwards, the strongest being referred to as the first.

The location of types of previously described species is indicated as follows:—

Institute of Hygiene and Tropical Medicine, Sydney—IHTM.  
Deutsches Entomologisches Institut, Berlin—DEI.  
Author's Collection—AC.  
U.S. National Museum, Washington—USNM.  
British Museum (Natural History), London—BM.  
Queensland Museum, Brisbane—QM.  
Hungarian National Museum, Budapest—HNM.  
Zoological Museum, Amsterdam—ZM.

Collectors are abbreviated as follows: D. K. McAlpine—D.K.M.; S. J. Paramonov—S.J.P.; K. A. Spencer—K.A.S.

#### ZOOGEOGRAPHY

The distributional pattern of the Australian Agromyzidae can be summarized as follows:—

Endemic (on basis of existing information),	37
Also in Oriental region,	14
Also in Palaearctic region,	2
Also in New Zealand,	1
Cosmopolitan,	3
	—
	57

The two Palaearctic species, *Phytomyza plantaginis* R.-D. and *P. vitalbae* Kalt., almost certainly represent introductions with European colonization. The aedeagus of *vitalbae* is strikingly different from that of *clematidicolla* Spencer, suggesting that the two species are not closely related, although feeding on the same host plant.

Of the 17 species common to the Oriental region, three are the Cosmopolitans *Calycomyza humeralis*, *Liriomyza brassicae*, *Phytomyza atricornis*; three feed on cultivated leguminous crops—*Melanagromyza centrosematis*, *M. phaseoli* and *M. sojae*—and *Pseudonapomyza spicata* occurs commonly on sugar and maize, and there seems little doubt that the natural distribution of these four species has been enlarged by commerce in recent times. *Ophiomyia lantanae* has been deliberately introduced to many areas as a possible aid in controlling *Lantana camara*. Some of the remaining nine species probably form part of the invasion from the north which occurred following the Pleistocene glaciation, when a land connection last existed across the present Torres Straits. Such species may be *Melanagromyza alternata* and *Liriomyza caulophaga*, whose known distribution is limited to South-east Asia and Australia. It seems certain, however, that others are of earlier origin. Two which definitely appear to fall within this category are *M. albisquama* Malloch (= *leguminum* Bezzi) and *M. alysicarpi* Bezzi, which were hitherto considered to be endemic on Fiji. If it is accepted that these two species reached Fiji by land connection and not by fortuitous subsequent crossing of a wide water gap, they provide interesting confirmation of the so-called "outer Melanesian arc", which, it is postulated, linked New Guinea to Fiji in the Miocene as a series of island stepping stones or even a direct land connection, when many Asiatic species also reached Australia. The wide range of *M. albisquama* across Asia and Africa to the Cape Verde Islands suggests that this is not a species of recent origin.