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Australia Expedition 1980; legit C.A.W. Jeekel and A.M. Jeekel-Rijvers. List of collecting stations, together with general notes on the distribution of Millipedes in eastern Australia and Tasmania

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I. Introduction

Owing to their limited possibilities for either active or passive dispersal, their association with the soil habitat, their vulnerability towards a dry atmosphere, and, in fact, on account of their general ecology and ethology, Diplopoda among arthropods are surely one of the most important classes in relation to the study of historical biogeography. For the class as a whole the sea appears to be an unsuperable barrier as is proved by the almost complete absence of endemic taxa on oceanic islands. In many cases lowland plains also act as severe obstacles against the dispersal of millipedes. The presence or absence of diplopods on islands or continents, therefore, may give a strong argument in favour or against any supposed former land connection. ')

The long geographical isolation of the Australian continent and the absence of endemic higher taxa seems to imply that most, if not all, of its diplopod fauna dates from the time this continent was solidly attached to other southern continents, i.e. the Mesozoic. Subsequent penetration of fauna elements from the north or northwest seems utterly unlikely, although perhaps not entirely impossible.

In comparison with Africa or South America the Australian fauna has a rather limited number of higher taxa among diplopods. However, the relatively small size of the continent, its long isolation, and the great amount

') *There are some exceptions to this general rule. The bristly millipedes, Polyxenida, are usually considered to have more possibilities for passive transportation. Certain members of the Spirostreptida, suborder Cambalidea, by evidence of their occurrence on small oceanic islands may have means of dispersal which are lacking in other diplopod groups, and perhaps the same applies to certain smaller species of the order Polydesmida. Some caution is, however, necessary with regard to conclusions in this respect, because the species involved may have been transported by human agency from their original countries where they may not yet have been discovered.*

of morphological diversity in some groups, makes the Australian fauna a particularly attractive object for phylogenetic studies. An almost world-wide distribution and a relatively rich development in Australia gives the Paradoxosomatidae (order Polydesmida) a certain advantage over other diplopod groups in this respect. Moreover, a study of the phylogeny of Australian Paradoxosomatidae might well clear the way to a better understanding of the phylogeny of the family as a whole.

Unfortunately, in spite of the political unity of the country and its relatively good accessibility, Australia of all southern continents is the least explored with regard to its diplopod fauna. What has been published on millipedes has been almost exclusively the work of European specialists, and no Australian contribution has ever appeared. Most descriptions of species have been based on incidentally collected samples preserved in European and American museums, and are more or less incorporated in systematic studies of a more general scope. Only two major European expeditions to Australia, the one by Mjöberg to Queensland and northern Australia, and the other by Michaelsen and Hartmeyer to Western Australia, have lead to more comprehensive studies. Two times small amounts of material of the Australian Museum, Sydney, were sent out to specialists abroad and resulted in important contributions by Brölemann, 1913, and Verhoeff, 1928. The only publication coming nearest to what might be called a monographic treatment of an Australian diplopod group is the paper by Silvestri, 1917, on the Sphaerotheriidae.

The lack of interest in the sustematic and faunistic study of millipedes among Australian biologists seems understandable. Unlike many other arthropods, diplopods are inconspicuous animals without bright colours or peculiar habits to attract the attention of people. There are no handbooks to facilitate identification or to give an easy access to the literature. No popular accounts to get acquainted with the diversity of the group are available.

The state museums are isolated and widely separated from eachother, and greatly under-staffed, especially in their arthropod sections. In spite of an apparent devotion to their tasks, one cannot expect these institutions to adequately cope with the immensely rich Australian arthropod fauna. Collecting activities are necessarily of an incidental nature, and useful as these may be in the absence of a coordinated programm, they cannot provide the basis for comprehensive faunistic studies.

One may wonder whether Australia, with its large territory and small population, will ever produce the broad scale of specialists needed for simply taking stock of the arthropod fauna of the continent.

In connection with this, it is highly regrettable that the measures taken by the federal and state governments in the interest of the protection of the fauna, understandable as they may be, are hardly appropriate to stimulate the efforts from the side of overseas specialists. Unilateral regulations impeding the export of scientific material, or obliging museums elsewhere to sign so-called holotype declarations, committing them to deposit holotypes of Australian species in Australian museums, seem reasonable enough. They may, however, lead to a dog-in-

the-manger attitude which completely discourages overseas taxonomists to pay special attention to the Australian fauna. One can hardly expect these people to spend their precious time and funds on the fauna of Australia, when so much work can be done elsewhere under more attractive conditions.

A more positive approach from the authorities, involving the initiation of faunistic projects sponsored either by the federal government or by the state governments, could evoke the participation of taxonomists from all over the world. The speed and size of habitat destruction, which is obvious to anyone travelling the country, can only emphasize the urgency of such a programm.

In the course of a long association with the study of the family Paradoxosomatidae on a world scale, the author has discussed the taxonomy and biogeography of Australian representatives of this group in several papers. A comprehensive study was planned already many years ago, but owing to the lack of appropriate collections to serve as a basis for such a study, the plan was temporarily postponed. Some remarks on particular evolutionary tendencies within the group have been published, but the number of known species in relation to the number expected to really occur is too small for a synthetic approach.

To cope with this situation the author planned an excursion with the main purpose to collect material in the principal area of the Australian paradoxosomatids: the east coast of the continent and Tasmania. The present report gives the list of stations of this journey, together with an indication of the diplopod groups collected at each station. Moreover, a general survey of the distribution of the diplopod groups in east Australia and Tasmania is given, incorporating both previous records and new localities.

II. Plan, itinerary and results

The previously recorded distribution of Paradoxosomatidae in Queensland, New South Wales, Victoria and Tasmania is not only very incomplete, but also quite unbalanced. In Queensland the wider surroundings of Cairns, i.e. the Atherton tableland, and the surroundings of Brisbane are the best explored regions, but the intermediate section of the coastal area is a blank where only a few incidental samples have been taken. Although the picture for New South Wales is decidedly better, inasmuch as the available information is more equally distributed over the coastal zone of the state, records are sparse and incomplete. From the state of Victoria only some records from the surroundings of Melbourne are available. From Tasmania a single species is known from its type-locality only.

In order to get a more regular pattern of localities a plan was set up to travel along the east coast of the continent from Cairns in the north down to Melbourne, and through Tasmania, and to take samples at more or less regular intervals. In this way it would be possible to obtain a better insight in the range of the genera, and possibly also of the species, along the east side of Australia and in Tasmania. Attention would be focussed on Queensland, and therefore a route was planned from Brisbane to Cairns and back along different roads. The whole journey was to take about two monthes and would start on September 24th and end on November 30th, 1980.

After arrival in Brisbane we made an excursion to Mt. Glorious, north-west of the city to get acquainted with the conditions and possibilities and found out that the excessively long period of drought which Australia had suffered already before our arrival, had had a disastrous effect on the accessibility of the myriapod fauna. The soil was dry and dusty, even under heavy logs, and the fauna normally occurring in the leaf litter and humus layer had obviously retired in the deeper layers of the soil. We had very little success and very little of the fairly rich known fauna of the Brisbane area was seen.

From Brisbane we took the Bruce Highway towards the north, incidentally turning off the main road at suitable localities to take samples, but the results were negative. We decided therefore to drive northward as quickly as possible, in the hope that conditions would be better on the Atherton tableland and in the meanwhile a change of climate would take place. From Innisfail we took the Palmerston Highway westward and the Kennedy Highway northward to Mareeba and Cairns, where we arrived on October 10th. In spite of intensive sampling very little material of diplopods was collected. The open sclerophyllous forests were almost like deserts and even the soil of the rainforests of the Atherton tableland was dusty and devoid of animal life. Only some dead remains of millipedes were incidental witnesses that we were looking at the right places.

A trip to Green Island off the coast of Cairns was interesting in as far as it yielded quite unexpectedly a series of rhinocricids hiding under logs in the dry sand, more dead than alive.

On the way south we again took the Bruce Highway since an alternative route more inland would certainly make no sense under the given circumstances. On the way some very brief and local showers occurred, which may have been the reason why a little more success was obtained during this journey. From Rockhampton we took the Burnett Highway to Goomeri, where we turned off to follow the Bunya Highway. Past Kumbia we turned off towards the Bunya Mountains and reached Dalby, where we took the Warrego Highway to Brisbane.

A slight change of wheather took place after our arrival in Brisbane on the 24th of October, and we experienced a period of two days of rain. Leaving Brisbane along Pacific Highway, we soon turned off to take the secondary road towards Natural Bridge, Murwillumbah, Kyogle and Casino, from where we followed the Bruxner Highway eastward. At Tenterfield we turned southward and followed the New England Highway to Maitland, by-passed Newcastle along secondary roads to join again the Pacific Highway towards Sydney.

Obviously, the weather front which had brought rain in Brisbane also had had its effects on our collecting results in northern New South Wales and we obtained a reasonable amount of material along this route. But again the heat soon dried out the upper soil layer again, and few millipedes were seen in the whole area between Newcastle and Sydney.

We departed from Sydney on November 5th following the Hume Highway to Goulburn, where we turned off to follow the secondary road along Tarago and Bungendore to Queanbeyan and Canberra. From there we went southward along the Monaro Highway to Cooma. Again drought had struck, and results were rather poor along this route.

From Cooma we made several excursions into the Snowy Mountains, where rain and snow showers provided excellent conditions for collecting millipedes. Continuing our journey we followed Snowy Mountains Highway to Bega, and from there drove along Princes Highway into Victoria up to Orbost. From there we turned northwest to Buchan and from there southwest via Bruthen to Bairnsdale, where we took Princes Highway again towards Traralgon. From Traralgon we turned southward to visit the Bulga and Tarra Valley National Parks, drove to Yarram, followed the South Gippsland Highway for a while and went up north along the Midland Highway, turning eastward along the Grand Ridge Road to Warragul. From there we went along the Princes Highway to Melbourne, where we arrived November 18th. Although most of the time between Cooma and Melbourne we were haunted by a heatwave, conditions on the whole were not as bad as those experienced in Queensland and in general the results of our collecting activities were reasonable, sometimes even very good.

Subsequently we flew to Hobart where we arrived on November 21st. We drove northward along the Midlands Highway to Launceston, from where we made an excursion to Ben Lomond National Park. Afterwards we drove along the West Tamar Highway to Beaconsfield to visit the Asbestos Range, and followed seondary roads to the Frankford Road in the direction of Devonport. From there we went along the Bass Highway to Somerset, followed the Waratah, Murchison and Zeehan Highways to Queenstown, and finally the Lyell Highway towards Hobart, visiting Lake St. Clair and Mt. Field National Parks. Throughout our stay in Tasmania weather conditions were excellent, and our results were quite satisfactory.

Although the primary goal of our expedition, to fill in the large gaps in the distributional data on east Australian Paradoxosomatidae was not reached, a fair and quite diverse collection of millipedes from east Australia and Tasmania was brought together. We could establish the occurrence of the order Craspedosomatida in New South Wales and in Tasmania and this is the first record of this order for the continent. Furthermore we can add the family Siphonotidae to the fauna of Tasmania, and the order Spirostreptida to the Victoria fauna. Furthermore it is noteworthy that according to our observations the family Spirobolellidae is fairly richly represented both in Queensland and in New South Wales. Species of this family appear to be local but may be found in large quantities in suitable habitats.

Unfortunately, our investigations in Queensland were severely obstructed by the exceptional climatic conditions at the time of our visit. Owing to this, large gaps in our knowledge with regard to the occurrence of Paradoxosomatidae in the whole area between Brisbane and Cairns remain to be filled. Members of this family were found in rainforests as well as in sclerophyllous forests, and in the latter habitats they may be quite numerous provided weather conditions are good.

It has become evident also that some of the paradoxosomatid species in the sclerophyllous forests have a fairly wide range, others however seem

to have a quite local distributional area, and it is clear that it will take a lot of exploration to discover these species, the more so since most of the known records and our data concern the coastal region of Queensland, New South Wales and Victoria. The entire distributional limit of the Paradoxosomatidae, as in fact of all millipedes, towards the dryer inlands of these states has to be defined.

With regard to Tasmania, the present conclusion is that the family is weakly represented there, and according to our observations occurs mainly in the eastern half of the island.

III. List of collecting stations

The names of the localities have been taken from the 1:250 000 Australia topographic maps issued by the Division of National Mapping, Department of Minerals and Energy, Canberra (A.C.T.), Australia. In all cases, however, they have been related to place names appearing on maps 12 and 13 of the Times Atlas of the World, comprehensive edition, London, 1968.

In separate columns each group of animals taken at each station is indicated by a +. The groups are numbered as follows:

1: Sphaerotheriida, Sphaerotheriidae	DIPLOPODA
2: Polyzoniida, Siphonotidae	
3: Spirobolida, Spirobolellidae	
4: Spirobolida, Rhinocricidae	
5: Spirobolida, Trigoniulidae	
6: Spirostreptida, Cambalidae and Iulomorphidae	
7: Craspedosomatida	
8: Polydesmida, Paradoxosomatidae	
9: Polydesmida, Dalodesmidae	
10: Scolopendrida, incl. Craterostigmatida	CHILOPODA
11: Geophilida	
12: Lithobiida	
13: Scutigerida	
14: Scorpiones	ARACHNIDA
15: Opiliones	
16: Araneida	
17: Crustacea	
18: Onychophora	
19: Vermes	
20: Insecta	

List of collecting stations, Queensland

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Brisbane (Kenmore)	27.IX	garden; under bark of tree (spider; on light (insects)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+
2	Maiala Natn. Park, 30 km WNW Brisbane	28.IX	along Maiala circuit track in rainforest, under logs	+	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	+
3	Beerwah State Forest, 7 km SSW Landsborough	29.IX	rather recently burned Eucalyptus and pine forest, under logs	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
4	Kondalilla Natn. Park, 11 km WSW Nambour	30.IX	along nature track in rainforest, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-	-	-	+
5	10 km N Nambour	30.IX	near rest area along Bruce Highway, 3 km N Yandina, rainforest gallery along creek, under logs	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
6	10 km W Childers	1.X	near rest area along Bruce Highway, Eucalyptus forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
7	Nerimbera, 7 km ESE Rockhampton	2.X	outskirts of village at foot of Mt. Dick, Eucalyptus forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
8	Crystal Creek Natn. Park, 13 km S Bambaroo	5.X	along nature track in rainforest near Crystal Creek falls, under stones and logs	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	-	+
9	Ingham	5.X	open waist land	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
10	Rungoo, 18 km N Ingham	6.X	rainforest gallery along creek in Eucalyptus forest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
11	Dallachy, 15 km NW Cardwell	6.X	rainforest gallery along creek in Eucalyptus forest	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
12	2 km N El Arish	6.X	near rest area along Bruce Highway, rainforest gallery along creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
13	Palmerston Natn. Park, near Tchupala falls, 20 km ESE Millaa Millaa	7.X	along nature track in rainforest, nder logs, stones and litter	+	-	-	-	+	-	-	+	+	+	+	-	-	+	-	+	+	+	-	+

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	∞
14	16 km N Ravenshoe	8.X	rainforest along the road between Ravenshoe and Atherton, near the junction to Herberton, under logs, litter and in earth and moulded trees	-	-	-	-	+	-	-	+	-	+	+	+	-	-	-	-	-	-	-	+	
15	Mt. Hypipamee (The Crater), 19 km S Atherton	8.X	along nature track in rainforest, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
16	Lake Eacham Natn. Park, 26 km SW Gordonvale	9.X	along nature track in rainforest, under logs	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	-	-	+	+	+	
17	Lake Barrine Natn. Park, 23 km SW Gordonvale	9.X	along nature track in rainforest, under logs	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	
18	5 km N Kuranda	10.X	along timber track in rainforest, State forest, under logs	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	+	-	+	-	+	
19	5 km S Redlynch, 8 km W Cairns	10.X	near Freshwater Creek, roadside with cultivated patch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
20	Green Island, 28 km NE Cairns	11.X	rainforest-mangrove vegetation, under logs	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
21	Harveys Creek, 8 km N Babinda	12.X	rainforest along Bruce Highway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
22	Etty Bay, 8 km SE Innisfail	12.X	margin of rainforest along creek	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	
23	Cardwell	13.X	along roadside, swamp, mangrove vegetation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
24	2 km N El Arish	13.X	rest area along Bruce Highway, grassland with Eucalyptus trees	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	
25	6 km S Aligator Creek, 24 km SE Townsville	14.X	Eucalyptus forest along the road to Mt. Elliott Natn. Park, just ouside the park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
26	Conway Natn. Park, near Shute Harbour, 23 km ENE Proserpine	15.X	rainforest-mangrove vegetation, along nature track, under logs	+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	+	-	-	-	-
27	Conway Beach, 19 km ESE Proserpine	15.X	roadside with cultivated patches near Saltwater Creek (insects); mangrove vegetation along sandy beach (other arthropods)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	+
28	North Mackay, 3 km NNE Mackay	17.X	along the road to Slade Point, Eucalyptus-mangrove vegetation, under logs and stones	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+
29	Eungella Natn. Park, 5 km W Netherdale	18.X	along Broken Hill track in rainforest, under logs	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+
30	Eungella Natn. Park, 5 km N Netherdale	18.X	roadside off Dalrymple Heights road, rainforest, under logs, stones and litter	+	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	-	+	+
31	Clarke Creek, NW Rockhampton	19.X	Eucalyptus forest along Bruce Highway, under logs	-	-	+	-	+	-	-	-	-	+	+	-	-	+	-	+	-	-	-	+
32	Moongan, 4 km N Mt. Morgan	20.X	Eucalyptus forest along Burnett Highway, under logs	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	Hamilton Creek, 3 km S Mt. Morgan	20.X	Eucalyptus forest along Burnett Highway, under logs	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+
34	2 km NE Dululu, 12 km NNE Wowan	20.X	Eucalyptus forest along Burnett Highway, under logs	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
35	Yaparaba, 33 km SE Biloela	20.X	along roadside 1 km off Burnett Highway, shrubs and Eucalyptus trees in grassland, under logs	+	-	+	+	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	+
36	Coominglah State Forest, 25 km NW Monto	21.X	Eucalyptus forest along Burnett Highway, under logs	-	-	+	-	+	-	-	+	-	+	+	-	-	+	-	-	-	-	-	+
37	O Bil Bil, 12 km NW Mundubbera	21.X	roadside off Burnett Highway, grassland with isolated Eucalyptus trees, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
38	Binjour, 18 km ENE Mundubbera	21.X	Eucalyptus forest along Burnett Highway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
39	8 km E Gayndah	22.X	along Burnett Highway, grassland with Eucalyptus trees, under logs	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	+
40	near Oakdene, 27 km ESE Gayndah	22.X	Eucalyptus forest along Burnett Highway, under logs	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	+
41	near Mt. Marcella, 36 km SSE Gayndah	22.X	grassland with Eucalyptus trees along Burnett Highway, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Cherbourg, 6 km S Murgon	22.X	Eucalyptus forest, under logs	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+
43	4 km ESE Murgon	22.X	Eucalyptus trees in grassland along Burnett Highway, under logs	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	+
44	Alice Creek, 10 km SW Kumbia, 26 km W Tarong	23.X	Eucalyptus forest, under logs	-	-	+	+	+	+	-	+	-	+	+	-	-	-	-	-	-	-	-	+
45	Bunya Mts. Natn. Park, 27 km WSW Tarong	23.X	Koonawarra near Mt. Kiangarow, along nature track in dry type rainforest, under logs	-	-	-	-	-	+	-	+	+	+	-	-	-	-	-	-	+	-	-	+
46	Plainland, 13 km E Gatton	24.X	garbage dumping place along Warrego Highway, ruderal vegetation with Eucalyptus trees, under logs	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
47	Pine Mountain, 7 km NW Ipswich	24.X	Eucalyptus forest, under logs	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	-
48	Brisbane (Kenmore)	X	garden, on light	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
49	Brisbane (Annerley)	26.X	garden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
50	Natural Bridge Natn. Park, 20 km NW Murwillumbah	27.X	along nature track in rainforest, under logs and stones	+	-	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	-	-	+

List of collecting stations, New South Wales

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
51	Murwillumbah	27.X	garden, on light	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
52	Mt. Warning Natn. Park	28.X	along nature track in rainforest at the foot of Mt. Warning, under logs, stones and litter	+	-	+	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+
53	Cherry Tree State Forest, near Mallanganee, 18 km E Tabulam	29.X	transition between dry sclerophyllous forest and rainforest along Bruxner Highway, under logs	+	-	+	-	+	+	-	+	-	-	+	-	-	-	-	-	+	-	-	+
54	5 km E Tabulam	29.X	Eucalyptus forest along Bruxner Highway, under logs	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+
55	8 km E Drake	29.X	Eucalyptus forest along Bruxner Highway, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-
56	Gibraltar Range State Forest, 40 km NNE Glen Innes	30.X	Eucalyptus forest along Gwydir Highway, under logs and cowdung	-	-	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-
57	20 km NNE Guyra	30.X	open Eucalyptus forest in grassland, under logs	-	-	-	-	+	-	-	+	-	+	-	-	-	-	-	-	+	-	-	+
58	Arding, 9 km NNE Uralla	31.X	roadside with Eucalyptus trees bordering grassland, under logs	-	-	-	-	+	+	-	+	-	+	+	-	-	-	-	-	-	-	-	+
59	16 km SW Uralla	31.X	near rest area along New England Highway, Eucalyptus forest, under logs	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
60	Piallamore, 13 km SE Tamworth	31.X	Eucalyptus trees in grassland, eroded soil, under logs	-	-	-	-	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+
61	5 km SSW Wallabadah, 14 km ESE Quirindi	1.XI	open Eucalyptus forest with grass undergrowth along New England Highway, under logs	-	-	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-
62	near Lake Glenbawn, 12 km ESE Scone	1.XI	open Eucalyptus forest with grass undergrowth, under logs; adjacent open grassland (Orthoptera)	-	-	+	-	-	+	-	-	-	+	-	-	-	-	-	-	+	-	-	+
63	Belford State Forest, 3 km E Belford, 9 km WNW Greta	2.XI	Eucalyptus forest, under logs	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
64	Heaton State Forest, 22 km SE Cessnock	2.XI	Eucalyptus forest, under logs and cowdung	-	-	-	-	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	+
65	Morton Natn. Park, Fitzroy Falls, 15 km SE Moss Vale	6.XI	sclerophyllous forest with dense undergrowth of shrubs, ferntrees along creek, along nature track, under logs and litter	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	-	-
66	4 km E Marulan, 35 km WSW Moss Vale	6.XI	grassland with Eucalyptus trees, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
67	5 km SW Bungendore, 20 km ENE Queanbeyan	7.XI	grassland with Eucalyptus trees, under logs	-	-	-	-	-	-	-	+	-	+	+	-	-	-	-	+	-	-	-	+
68	10 km N Michelago, 39 km N Bredbo	7.XI	grassland with Eucalyptus trees along Monaro Highway, under logs	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	+	-	-	-	-
69	Kosciusko Natn. Park, 2 km E Sawpit Creek, 9 km NNW Jindabyne	8.XI	wet sclerophyllous forest with sparse undergrowth along Summit Road, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	+
70	Kosciusko Natn. Park, 2-4 km WSW Perisher Valley, 20 km W Jindabyne	8.XI	upper region of wet sclerophyllous forest with dense undergrowth along Summit Road, under stones	-	-	-	-	-	-	-	+	-	+	+	+	-	-	-	-	-	-	+	+
71	Kosciusko Natn. Park, Rennex Gap, 12 km NW Jindabyne	8.XI	open wet sclerophyllous forest with dense undergrowth and grassland, along Summit Road, under logs and stones	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+
72	15 km WSW Jindabyne	9.XI	wet sclerophyllous forest along the Alpine Way, just before the entrance of Kosciusko Natn. Park, under logs	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	+	-	-	-	+
73	12 km N Berridale, 25 km NE Jindabyne	9.XI	Eucalyptus trees in grassland, under logs	-	-	-	-	-	-	-	+	+	+	+	-	-	+	-	+	-	-	-	+
74	5 km WNW Adaminaby	9.XI	Eucalyptus trees in grassland, along Snowy Mts. Highway, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	+	+

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
75	Kosciusko Natn. Park, Larry's Creek, between Kiandra and Cabramurra, 35 km WNW Adaminaby	10.XI	open space with grass, rather wet, in Eucalyptus forest, under logs	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+
76	Gang Gang Creek, 15 km ESE Kiandra, 16 km WNW Adaminaby	10.XI	Eucalyptus forest with sparse undergrowth, under logs and in moulding logs	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-	+	-	-	-	-
77	Cooma	10.XI	in and around motel, garden	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-
78	7 km SSE Nimmitabel	11.XI	open Eucalyptus forest with grass undergrowth along Snowy Mts. Highway, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+
79	2 km SW Cobargo	11.XI	garbage dumping place, disturbed Eucalyptus forest with grass undergrowth along Princes Highway, under logs	-	-	+	-	-	-	-	+	-	+	+	-	-	-	-	+	-	-	-	+
80	Quaama	11.XI	Eucalyptus trees in grassland along Princes Highway, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
81	Ben Boyd Natn. Park, 5 km SW Eden	12.XI	Eucalyptus forest along Princes Highway, under logs	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
82	Boydtown, 5 km SSW Eden	12.XI	rather wet Eucalyptus forest, disturbed, under logs	-	-	+	-	-	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-
List of collecting stations, Victoria																							
83	Cann River	12.XI	in village	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
84	Drummer State Forest, 15 km E Cann River	13.XI	Eucalyptus forest along Princes Highway, under logs	-	-	-	-	-	+	-	+	+	+	-	-	-	-	-	-	-	-	-	+
85	13 km SE Buchan	14.XI	Eucalyptus forest, State Forest, under logs	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	+
86	4 km ESE Bruthen	14.XI	Eucalyptus forest, State Forest, under logs	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
87	Mt. Taylor, 11 km NNW Bairnsdale	14.XI	fragment of Eucalyptus forest, along roadside between grassland, under logs and litter	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-	+	-	-	-	+
88	Glenaladale Natn. Park, 28 km WNW Bairnsdale	15.XI	dry type rainforest along creek, along nature track, under logs, stones and in litter	-	-	-	-	-	+	-	+	+	+	-	-	-	+	-	-	-	-	+	+
89	Toongabbie, 18 km NNE Traralgon	15.XI	margin of Eucalyptus forest, with grassland, under logs	-	-	-	-	-	-	-	+	-	+	-	-	+	+	+	-	-	-	+	+
90	Bulga Natn. Park, 25 km SSE Traralgon	16.XI	along nature track in temperate rainforest with ferntrees, under logs and in soil	+	-	-	-	-	-	-	+	-	-	+	+	-	-	-	+	-	-	+	+
91	Tarra Natn. Park, 16 km NW Yarram	16.XI	along nature track in temperate rainforest with ferntrees, under logs and in soil	+	-	-	-	-	+	-	-	+	+	-	+	-	-	-	-	-	-	+	-
92	Gunyah Gunyah, 32 km SSW Morwell	17.XI	timber track along Grand Ridge Road, temperate rainforest with fern trees, under logs	-	-	-	-	-	+	-	+	+	-	+	-	-	-	-	+	-	-	-	-
93	Ferntree Gully Natn. Park, 18 km NNE Dandenong	18.XI	along nature track in temperate rainforest with ferntrees, under logs and litter and in moulded trees	-	-	-	-	-	+	-	+	+	+	+	-	+	-	-	-	-	-	-	-
List of collecting stations, Tasmania																							
94	4 km NE Melton Mowbray, 10 km N Kempton	22.XI	Eucalyptus trees in grassland along Midlands Highway, under logs, litter and stones	-	-	-	-	-	-	-	+	-	+	+	-	-	+	-	+	-	-	-	+
95	4 km E Conara Junction	22.XI	Eucalyptus trees in grassland along the Esk Main Road, under logs and litter	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	+	-	-	-	+

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
96	Ben Lomond Natn. Park, 35 km ENE Evandale	23.XI	along the road to the top of Ben Lomond, near the park ranger office, wet sclerophyllous forest with dense undergrowth of shrubs, under logs, litter and in humus	+	-	-	-	-	+	-	+	+	+	+	+	-	-	-	+	-	-	-	+
97	10 km NE Blessington, 28 km ENE Evandale	23.XI	dry type Eucalyptus forest in grassland, under logs	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-	+	-	-	+	+
98	Asbestos Range Natn. Park, Badger Head, 12 km W George Town	24.XI	dry hillslope with Eucalyptus and Pinus, under logs	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-	-	-	+	-
99	8 km NW Frankford, 15 km SW Beaconsfield	24.XI	open Eucalyptus forest with grassland, rather wet, under logs and in soil	+	-	-	-	-	-	-	+	+	+	+	-	-	+	-	+	-	-	+	+
100	Hellyer Gorge, 32 km SSW Somerset	25.XI	temperate rainforest (Nothofagus, Eucalyptus, Dicksonia) along the Hellyer River, under logs	-	-	-	-	-	+	+	-	+	-	-	+	-	-	+	+	-	-	-	+
101	Victoria Pass, 18 km ESE Queenstown	26.XI	open heath vegetation, with remains of Eucalyptus, along Lyell Highway, under logs	-	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
102	10 km ESE Victoria Pass, 28 km ESE Queenstown	26.XI	isolated Eucalyptus trees with dense heath undergrowth, wet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
103	12 km SW Derwent Bridge	26.XI	open, recently burned Eucalyptus forest, rather wet, under logs	-	-	-	-	-	+	-	-	+	+	-	-	-	-	+	-	-	-	+	-
104	Lake St. Clair Natn. Park, near Cynthia Bay, 5 km WNW Derwent Bridge	26.XI	wet Eucalyptus forest, under logs	-	-	-	-	-	+	+	-	+	+	+	-	-	-	-	-	-	-	+	+
105	Mt. Field Natn. Park, 4 km W National Park, 9 km NNE Maydena	27.XI	upper zone of temperate rainforest (Nothofagus, Eucalyptus, Dicksonia) along nature track, very wet soil, under logs	-	-	-	-	-	+	+	-	+	+	+	-	-	-	-	+	-	-	-	+

Nr.	Locality	Date	Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
106	Mt. Field Natn. Park, 7 km W National Park, 8 km N Maydena	27.XI	wet sclerophyllous forest with dense undergrowth of heath, under logs	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
107	Mt. Field Natn. Park, Russell Falls, 12 km ENE Maydena	27.XI	temperate rainforest with ferntrees along creek, under logs and litter	-	+	-	-	-	+	+	-	+	+	+	-	-	-	-	-	+	-	-	+
108	Mt. Wellington, 7 km SW Hobart	28.XI	wet sclerophyllous forest with some ferntrees, under logs, stones and litter	-	+	-	-	-	+	-	-	+	-	+	-	-	-	-	+	-	-	-	+

IV. Some aspects of the distribution of millipedes in eastern Australia and Tasmania

In order to visualize the results of our journey, a survey of the known distribution of higher millipede taxa in eastern Australia and Tasmania is given, incorporating both previous records and newly established occurrences. In order to give this survey a practical purpose, it is not produced as a literature catalogue, but as a series of maps of the four eastern states in which the localities of previous records and new records are indicated, and which are accompanied by lists of localities giving for each the recorded species.

General remarks

According to data in literature and our own observations the fauna of eastern Australia and Tasmania has the following orders and families of Diplopoda:

	Qld.	N.S.W.	Vic.	Tas.
Polyxenida	+	-	-	-
Sphaerotheriida, Sphaerotheriidae	+	+	+	+
Polyzoniida, Siphonotidae	+	-	+	+
Siphonophoridae	+	-	-	-
Spirobolida, Spirobolellidae	+	+	-	-
Rhinocricidae	+	-	-	-
Trigoniulidae	+	+	-	-
Spirostreptida, Cambalidae	+	+	-	-
Iulomorphidae	+	-	+	+
Craspedosomatida	-	+	-	+
Polydesmida, Paradoxosomatidae	+	+	+	+
Dalodesmidae	+	+	+	+

With the exception of the Craspedosomatida, all recorded groups are known to occur in Queensland, and a certain amount of depauperization of the fauna going from north to south seems evident.

As far as known, Siphonophoridae and Rhinocricidae are confined to Queensland. On account of their presence near the border of New South Wales it seems likely, however, that certain species may extend their range into the extreme north of that state.

The families Spirobolellidae, Trigoniulidae and Cambalidae have been recorded from Queensland as well as from New South Wales. Trigoniulidae have been recorded as far southward as the Blue Mountains; their occur-

rence may extend a little more southward, but they are unlikely to be found either in Victoria or Tasmania. A trigoniulid described from South Australia seems to have been misplaced as to family, and may actually prove to be a spirobolellid.

Spirobolellidae have been collected by us down to the extreme south-east of New South Wales; it seems likely that they may be found sooner or later in Victoria also. Their presence in Tasmania, however, seems not very likely.

It remains to be seen whether or not Cambalidae occur also in Victoria and Tasmania. We collected quite some samples of Spirostreptida in these states, which have not yet been identified down to family level.

Of the remaining groups, Sphaerotheriidae, Paradoxosomatidae and Dalodesmidae have been recorded from the four states. Those which may not yet have been recorded from each state, as is the case for the Polyxenida, Siphonotidae and Iulomorphidae, may be expected to be found after a more thorough exploration.

With the exception of the Craspedosomatida, which may prove to be really absent from the Queensland fauna, and thus may be confined to south-eastern Australia and Tasmania, there is no evidence of a qualitative depauperization of the fauna from the south to the north, but there is little doubt that Spirostreptida and Dalodesmidae occur in greater quantity in Tasmania than in Queensland.

Comparison of the fauna of eastern Australia and Tasmania with the fauna of West Australia

The fauna of eastern Australia and Tasmania is decidedly more diversified than that of West Australia, as is shown by the following table:

	W.Austr.	eastern Austr.
Polyxenida	+	+
Sphaerotheriida	-	+
Polyzoniida, Siphonotidae	+	+
Siphonophoridae	-	+
Spirobolida	-	+
Spirostreptida, Cambalidae	-	+
Iulomorphidae	+	+
Craspedosomatida	-	+
Polydesmida, Paradoxosomatidae	+	+
Dalodesmidae	+	+

The absence of certain groups in West Australia may be due to climatic conditions, and this may hold for Siphonophoridae, part of the Spirobolida and the Craspedosomatida. The lack of any record of Sphaerotheriida and Spirobolellidae is of special interest, but cannot yet be explained.

The fauna of eastern Australia and Tasmania compared with the faunae of New Guinea and New Zealand

It is also interesting to see which of the diplopod groups which occur in eastern Australia and Tasmania are represented in the two main faunal areas adjacent to Australia. New Guinea has a number of higher taxa not represented in Australia and New Zealand, and these taxa have been omitted from the following table.

	eastern Aust.	N.Zeal.	N.Guin.
Polyxenida	+	-	+
Sphaerotheriida	+	+	-
Polyzoniida, fam. Siphonotidae	+	+	-
fam. Siphonophoridae	+	-	+
Spirobolida, fam. Spirobolellidae	+	+?	-
fam. Rhinocricidae	+	-	+
fam. Trigoniulidae	+	-	+
Spirostreptida, fam. Cambalidae	+	+	-
fam. Iulomorphidae	+	-	-
Craspedosomatida	+	+	-
Polydesmida, fam. Paradoxosomatidae	+	-	+
fam. Dalodesmidae	+	+	-

A remarkable point evolving from the above table is, that, generally speaking, the taxa which eastern Australia and Tasmania share with New Zealand do not occur in New Guinea, and those which they share with New Guinea are lacking in New Zealand. The only exceptions to this rule appear to be the questionable record of a spirobolellid from New Zealand, which should be confirmed, and the absence of the Iulomorphidae from the New Zealand fauna. Unfortunately the fauna of New Zealand iuliform millipedes has not been worked out adequately, and more accurate data on these groups are needed.

A conclusion likely to be drawn from this distributional pattern is that, whereas the groups which Australia shares with New Zealand are fauna elements dating from the time Australia and New Zealand were connected as part of eastern Gondwanaland, the groups which Australia shares with New Guinea may have entered Australia from the north.

Little can be said against the first part of this conclusion. Some doubt

must be expressed with regard to the general validity of the second.

In relation with the phylogeny of the Paradoxosomatidae, it has been shown that the Australian members of this family belong to the well-defined subfamily Australiosomatinae, which in New Guinea and adjacent islands is represented by the tribe Aschistodesmini. But New Guinea has also the paradoxosomatid tribe Eustrongylosomatini, belonging to the subfamily Paradoxosomatinae, a large subfamily with an almost world-wide distribution. The latter tribe is likely to have reached New Guinea by dispersal from south-east Asia. The Aschistodesmini are to be regarded as intruders from Australia. In spite of their absence in New Zealand, the Paradoxosomatidae of Australia are to be regarded as a gondwana fauna-element.

With regard to the occurrence of the families Siphonophoridae, Trigoniulidae and Rhinocricidae on both sides of the Torres Straits little can be said. The phylogenetic status of the genera involved has not been worked out yet. It is therefore not yet clear whether or not they should be regarded as gondwana fauna-elements which have penetrated New Guinea from Australia, or that they entered Australia from the north.

Introduced species and synanthropic fauna

Unlike so many other countries in tropical and temperate regions, eastern Australia appears to lack a diverse and generally distributed fauna of introduced millipedes. The only records thus far in literature concern the occurrence in Tasmania of the following European species: *Brachydesmus superus* Latzel, 1884 (Polydesmida, Polydesmidae), *Blaniulus guttulatus* (Fabricius, 1798) (Julida, Blaniulidae), *Ophyiulus pilosus* (Newport, 1842), and *Ommatoiulus moreletii* (Lucas, 1860) (Julida, Julidae). Moreover, Miss Alison Green (in litt.) informs me that the Tasmanian Museum has samples of *Cylindroiulus britannicus* (Verhoeff, 1891) and *Brachyiulus pusillus* (Leach, 1815) (Julida, Julidae), identified by Dr. P.M. Johns. In the United States some of these species have penetrated the natural habitats on a large scale. A similar dispersal seems not to have occurred yet in Tasmania, at least we did not find any European species during our excursion.

On the Australian mainland the climate is probably not quite acceptable to West-European millipedes. We may, however, expect certain mediterranean and tropical species there, and the recent report by Baker (1978) concerning the occurrence of *Ommatoiulus moreletii* in South Australia has shown, that once such a species has settled it may reproduce itself and disperse very rapidly.

Of the endemic Australian fauna only a single species of the family Paradoxosomatidae, *Akamptogonus novarae* (Humbert & De Saussure, 1869) is known to have synanthropic tendencies. This species, the country of origin of which is not known although it seems likely that it originated from somewhere in southeastern Australia, was described from New Zealand, and subsequently reported from Albany, West Australia, and Sutherland, N.S.W. It appears to spread gradually through human agency, and has been recorded recently from California, U.S.A., and became known from Hawaii (unpublished).

Passive dispersal of millipedes within Australia seems to be restricted to this instance, but other cases may turn up in the future. Certain active species may penetrate biotopes under heavy human influence, and may become transported. In this respect the observation of an apparently undescribed species of the Paradoxosomatidae walking about after dark in the garden of a motel at Cooma, and even entering motelrooms, may be of importance.

Distribution of orders and families

In the maps on the following pages the known distribution of the various orders and families in eastern Australia and Tasmania is indicated by black dots marked by capitals. The capitals refer to the list of localities with the species recorded accompanying the maps. The stations where we collected material of each group are indicated by open circles accompanied by the station numbers from the list of collecting stations. Moreover, for each group a brief evaluation of the present status of its taxonomy and the general picture of its distribution is given. Finally the references are given from which the distributional data have been taken.

In those cases where the localities are type or syntype localities the name of the species is followed either by a T or by T 1, T 2, etc.

Polyxenida

Taxonomy

This group of tiny bristly millipedes is generally neglected by students of diplopods, apparently mainly because of the different techniques of collecting and examination to be adopted. Only one species has been recorded from the area involved, and this is referable to the genus *Lophoturus* Brölemann, 1931 (type-species: *L. obscurus* Brölemann, 1931) of the family Lophoproctidae. Several more genera and species can be expected in eastern Australia and Tasmania.

Distribution

Although Polyxenida have been reported from north Queensland only, the group in general is not confined to tropical or subtropical regions and therefore we may expect them to turn up everywhere in eastern Australia and Tasmania. A representative of the genus *Unixenus* Jones, 1944 (family Polyxenidae) has been recorded from Western Australia, and a species of *Synxenus* Silvestri, 1900 (family Synxenidae) from South Australia. Zoogeographically the group differs from all other diplopod orders in the much wider distributional areas of the genera and species.

Literature

Condé, 1979; Verhoeff, 1924.

Distribution in Queensland

●: locality of described species

') A: Cedar Creek - *Lophoturus queenslandicus* (Verhoeff, 1924) (T)

No material collected.

') *geographical position to be established; possibly in the Atherton tableland northwest of Cairns.*

Sphaerotheriida

Taxonomy

All Australian representatives of this order belong to the family Sphaerotheriidae, subfamily Sphaerotheriinae, tribus Cyliosomatini (Jeekel, 1974), and this tribus occurs also in New Zealand. Unfortunately, the classification within the group is still rather chaotic. Next to a number of descriptions by earlier authors, which are insufficient for the recognition of the species, the group has the disadvantage of a serious lack of coherence in the treatment by more recent workers. Silvestri (1917) published a most useful synopsis of the Cyliosomatini which should have served as a basis for subsequent taxonomic work. But his paper was overlooked by Verhoeff (1924, 1928).

Silvestri distinguished two generic categories, *Cyliosoma* Pocock, 1895 (type-species: *Sphaerotherium angulatum* Butler, 1878) and *Procyliosoma* Silvestri, 1917 (type-species: *Procyliosoma leae* Silvestri, 1917). Unfortunately he did not re-examine the type-species of *Cyliosoma* and his application of this name to either of the two genera was entirely arbitrary. It is not certain if the diagnosis of *Cyliosoma* sensu Silvestri really covers the type-species of the genus. The two genera are easily distinguished on account of the quite different structure of the two pairs of telopods of the males.

A similar division of Australian pill-millipedes was proposed by Verhoeff, 1924, who next to the arbitrary use of the name *Cyliosoma* erected the name *Cyliosomella* Verhoeff, 1924 (type-species: *Cyliosomella castanea* Verhoeff, 1924) for the other genus. According to the diagnosis of *Cyliosomella*, this name covers the same concept as *Procyliosoma*. Both Silvestri and Verhoeff independently created some subgenera within their two genera on account of the number of antennal sensory cones, a character hardly appropriate for the distinction of monophyletic taxa. The names, *Epicyliosoma* Silvestri, 1917 (type-species: *Zephronia albertisii* Silvestri, 1895) *Paracyliosoma* Verhoeff, 1928 (type-species: *Cyliosoma penicilligerum* Verhoeff, 1928) and *Syncyliosoma* Silvestri, 1917 (type-species: *Procyliosoma aurivillii* Silvestri, 1917), are eventually available to cover subgeneric categories should the necessity arise.

Distribution

In Australia pill-millipedes have been recorded from Torres Straits in the north southward down to Victoria. In Tasmania they have so far been reported only from the eastern half of the island. They are not known to occur in South Australia and West Australia.

As far as the available evidence permits conclusions *Cyliosoma* sensu Silvestri/Verhoeff is the dominant genus in the northern part of the range of the tribus. It extends southward as far as Cambewarra, N.S.W., and has not yet been reported from Victoria or Tasmania. *Procyliosoma* almost completely covers the range of *Cyliosoma* but occurs also in Tasmania and probably in Victoria as well. *Procyliosoma* is also represented in New Zealand as the only sphaerotheriid genus there.

Sphaerotheriidae are completely lacking in the New Guinea archipelago.

According to our observations the sphaerotheriids in Australia inhabit rainforests, sometimes in thin populations, sometimes rather abundantly. They were found by us also in the wetter type sclerophyllous forests provided there is a sufficiently substantial litter and humus layer.

Literature

Attems, 1898a; Brölemann, 1913; Butler, 1872, 1878; Chamberlin, 1920b; Karsch, 1881a; C.L. Koch, 1847, 1863; Pocock, 1893; Silvestri, 1895, 1897, 1898, 1917; Verhoeff, 1924, 1928.

Without locality

"Sphaerotherium" convexum C.L. Koch, 1847 (T)

Distribution in Queensland

●: localities of described species

A: Torres Straits - *"Zephronia" larvalis* Butler, 1878 (T)

B: Cape York - *Procyliosoma aurivillii* Silvestri, 1917 (T)

C: Somerset - *Cyliosoma albertisii* (Silvestri, 1895) (T)

D: Cooktown - *"Zephronia" glaberrima* Attems, 1898 (T)
Cyliosoma pachygon Chamberlin, 1920 (T)

E: Kuranda - *Cyliosoma kurandanum* Chamberlin, 1920 (T)

F: Cairns - *Cyliosoma sennae* Silvestri, 1898 (T)
Cyliosoma targionii Silvestri, 1898 (T)

G: Herberton - *Cyliosoma castanea* Verhoeff, 1924 (T)
Cyliosoma queenslandiae Brölemann, 1913

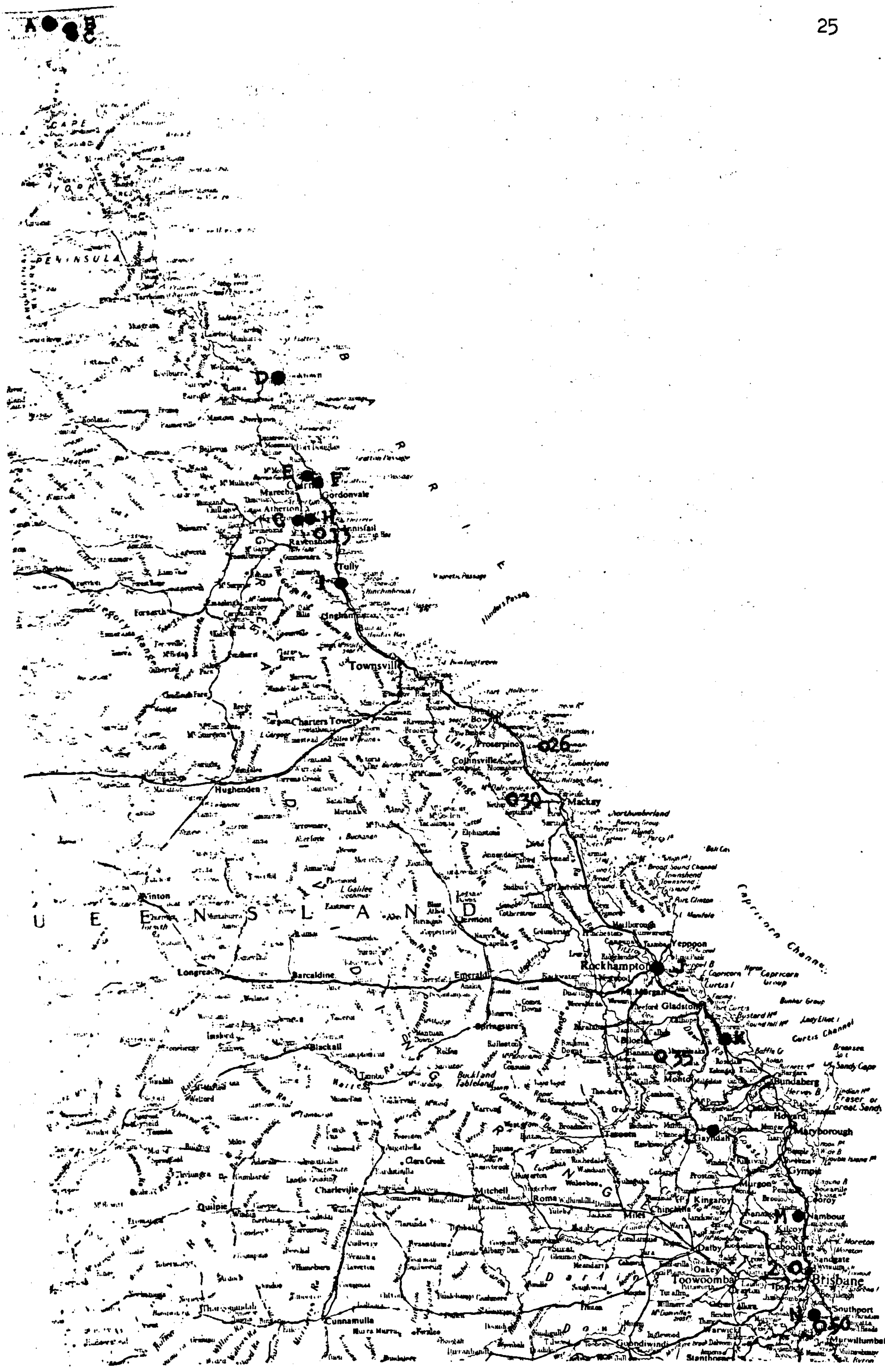
H: Malanda - *Cyliosoma queenslandiae* Brölemann, 1913

I: Cardwell - *Cyliosoma sjoestedti* Silvestri, 1917 (T)

J: Rockhampton - *"Sphaerotherium" marginepunctatum* Karsch, 1881 (T)
Cyliosoma angulatum Butler, 1878 (T)

K: Colosseum - *Cyliosoma queenslandiae mjoebergi* Verhoeff, 1924 (T)

L: Gayndah - *Cyliosoma queenslandiae* Brölemann, 1913 (T)
Cyliosoma unicolor Silvestri, 1897 (T)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Innisfail
Ravenshoe
Tully
Ingham
Townsville
Charters Towers
Bowen
Proserpine
Collinsville
Mackay
Hughenden
Winton
Longreach
Barcaldine
Emerald
Clermont
Springsure
Blackall
Rockhampton
Yeppoon
Mt Morgan
Gladstone
Biloela
Monto
Bundaberg
Maryborough
Gympie
Nambour
Caboolture
Brisbane
Ipswich
Southport
Murwillumbah
Toowoomba
Warwick
Stanthorpe
Goondiwindi
Dalby
Kingaroy
Gayndah
Miles
Roma
Mitchell
Charleville
Quilpie
Cunnamulla
Forsayth
L Galilee
Capricorn Channel
Capricorn Group
Bunker Group
Curtis Channel
Great Sandy

M: Blackall Range - *Cyliosoma denticulatum* Verhoeff, 1924 (T)

N: Mt. Tamborine - *Cyliosoma queenslandiae* Brölemann, 1913

o: localities of collected specimens

Sta. Nr. 2, 13, 26, 30, 35, 50.

Distribution in New South Wales

●: localities of described species

A: Upper Richmond River - *Cyliosoma excavatum* Verhoeff, 1928 (T)
Cyliosoma queenslandiae Brölemann, 1913
Cyliosomella andersoni Verhoeff, 1928 (T)

B: Richmond River - *Cyliosoma froggatti* Silvestri, 1917 (T)

C: North Dorrigo - *Cyliosoma penicilligerum* Verhoeff, 1928 (T)
Cyliosomella andersoni dorrigense Verhoeff, 1928 (T)

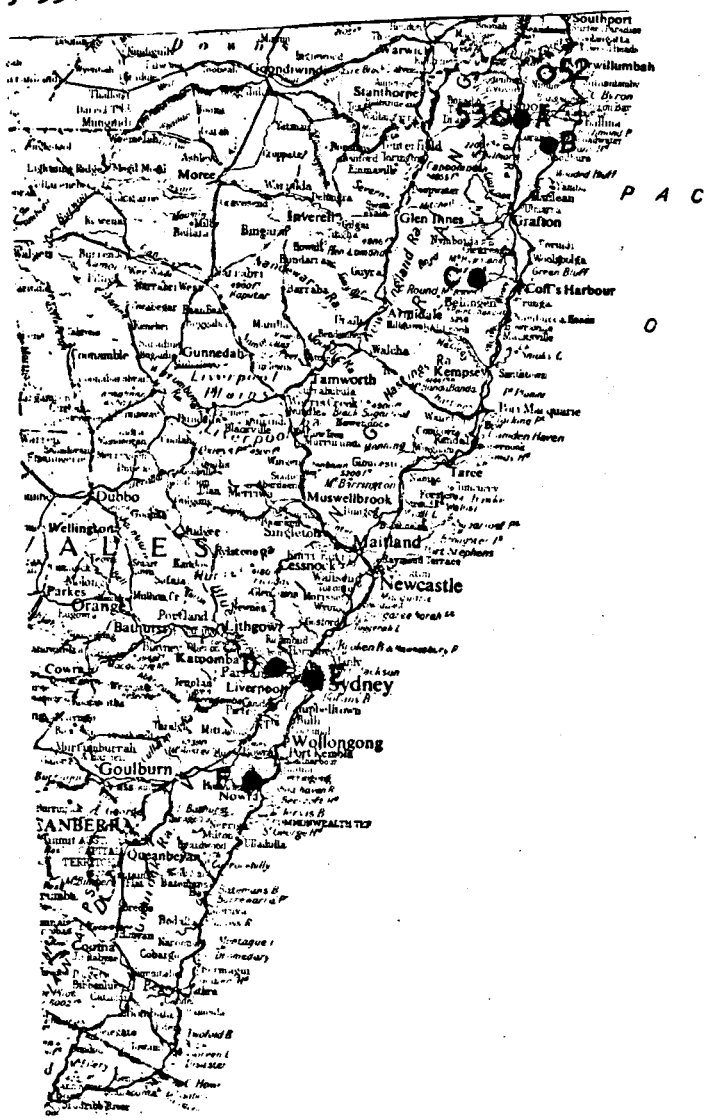
D: Penrith - *Cyliosoma penrithense* Brölemann, 1913 (T 1)

E: Sydney - *Cyliosoma walesianum* (Karsch, 1881) (T)

F: Cambewarra - *Cyliosoma penrithense* Brölemann, 1913 (T 2)

o: localities of collected specimens

Sta. Nr. 52, 53.



Distribution in Victoria

No locality - *"Sphaerotherium" fraternum* Butler, 1872 (T)

o: localities of collected specimens

Sta. Nr. 90, 91.

Distribution in Tasmania

●: localities of described species

A: Hobart - *Procyliosoma leae* Silvestri, 1917 (T)

Procyliosoma tasmanicum Silvestri, 1917 (T)

o: localities of collected specimens

Sta. Nr. 96, 99.

Polyzoniida

Taxonomy

Recently this order has been divided into two separate orders, Polyzoniida s.str. and Siphonophorida (Hoffman, 1980). The first of these is represented by species of the family Siphonotidae, but the use of the generic names *Siphonotus* Brandt, 1837, and *Rhinotus* Cook, 1896, may prove to be incorrect when the family is revised. The known Australian species are adequa tely described, with the exception of the unrecognizable *"Siphonotus" brevicornis* Pocock.

The Siphonophorida is represented by some species of the genus *Siphonophora* Brandt, 1837 (family Siphonophoridae). The known Australian species are reasonably well described, but their exact generic position has to be established.

Distribution

Polyzoniida sensu stricto probably occur in suitable habitats throughout Australia, although they have been reported so far only from a single locality in Queensland, a single locality in Victoria and from West Australia. We collected some specimens in Tasmania, and it has become obvious that only by collecting under suitable weather conditions a substantial contribution to the knowledge of the distribution of the group can be made.

Siphonophorida are more strictly confined to tropical regions. They have been described from several localities in Queensland, where they seem to be confined to rainforest biotopes. It is likely that the excessive drought during our journey through Queensland is responsible for the absence of the group in our collections.

Polyzoniida should be sought after in moulded logs and tree stumps.

Literature

Pocock, 1903; Verhoeff, 1924.

Distribution in Queensland

●: localities of described species

A: Tolga - *Siphonophora nasuta* Verhoeff, 1924 (T 1)

B: Atherton - *Siphonophora nodulosa* Verhoeff, 1924 (T 1)

C: Malanda - *Siphonophora nodulosa* Verhoeff, 1924 (T 2)

D: Evelyn - *Siphonophora nasuta* Verhoeff, 1924 (T 2)

') E: Cedar Creek - *Siphonophora mjoebergi* Verhoeff, 1924 (T)

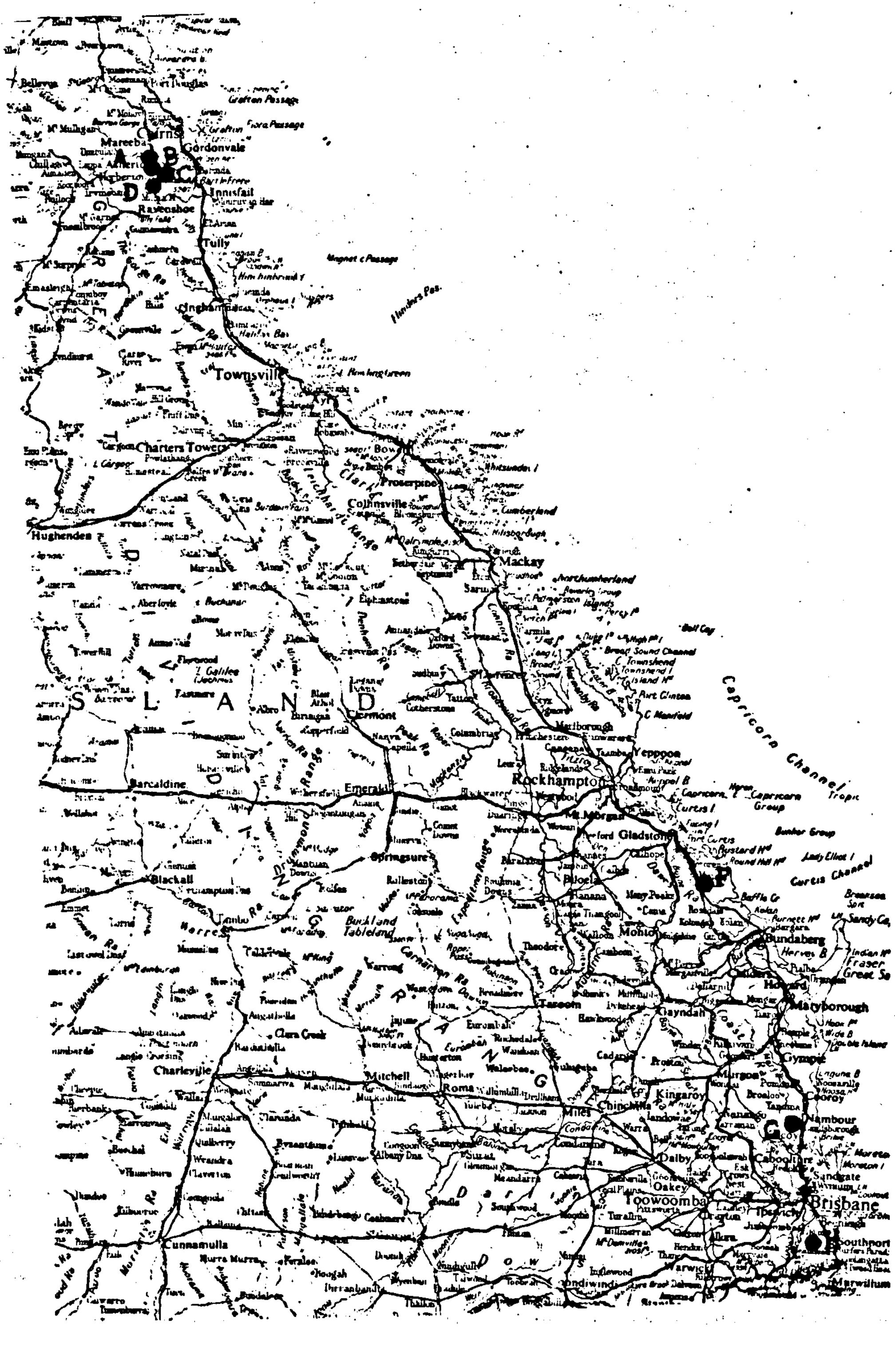
F: Colosseum - *Siphonophora nasuta* Verhoeff, 1924 (T 3)

G: Blackall Range - *Rhinotus mjoebergi* Verhoeff, 1924 (T)
Siphonotus latus Verhoeff, 1924 (T)

H: Mt. Tamborine - *Siphonophora nodulosa* Verhoeff, 1924 (T 3)

No material collected

') *geographical position to be established,* *see p. 22.*


Mareeba
Gordonvale
Innisfail
Ravenshoe
Tully
Ingham
Townsville
Charters Towers
Hughenden
Proserpine
Collinsville
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Barcaldine
Emerald
Rockhampton
Yeppoon
Gladstone
Capricorn Channel
Springsure
Blackall
Tambo
Biloela
Monto
Bundaberg
Maryborough
Gympie
Gayndah
Taroom
Charleville
Mitchell
Roma
Miles
Chinchilla
Kingaroy
Nambour
Dalby
Oakey
Toowoomba
Brisbane
Ipswich
Southport
Cunnamulla
Warwick
Goondiwindi
Fraser
Curtis Channel
Whitsunday I
Cumberland
S L A N D
R A N G

Distribution in Victoria

●: locality of described species

A: Narre Warren - *"Siphonotus" brevicornis* Pocock, 1903 (T)

Distribution in Tasmania

o: localities of collected specimens

Sta. Nr. 107, 108.

Spirobolida, Spirobolellidae

Taxonomy

The classification of the Australian species of this family is rather confused, partly because some of the described species are insufficiently characterized, partly because of uncertainty with regard to the characters which may be used for the distinction of genera. Relatively few species have been described, and most of these were referred to mono- or bitypical genera. Monotypical are *Queenslandobolus* Verhoeff, 1924 (type-species: *Q. sjoestedti* Verhoeff, 1924), *Poratobolus* Verhoeff, 1924 (type-species: *P. mjoebergi* Verhoeff, 1924), and *Walesbolus* Verhoeff, 1928 (type-species: *W. lobatus* Verhoeff, 1928). Bitypical are *Attemsobolus* Verhoeff, 1924 (type-

species: *A. bivittatus* Verhoeff, 1924) and *Strophobolus* Chamberlin, 1920 (type-species: *S. immigrans* Chamberlin, 1920). The gonopods of the species of the latter genus have not been illustrated.

The genus *Spirobolellus* Pocock, 1894 (type-species: *S. chrysodirus* Pocock, 1894) has been used for a long time as a dumping place for almost all of the old world Spirobolellidae and is still in use for some Australian species. It seems unlikely, however, that it is really represented in the Australian fauna.

From the description of *"Spirobolus" lugubris* L. Koch, 1867, I infer that this is most likely to be a spirobolellid, rather than a trigoniulid or a rhinocricid.

Distribution

Although relatively few records of the occurrence of spirobolellids in Australia are available, they are known to occupy a zone along the east coast of the continent from the Atherton tableland in north Queensland down to south-east New South Wales. Our investigations have made it clear that representatives of this family are relatively common in the dry type sclerophyllous forests, where they may be even quite numerous locally. They are also found in rainforests, though usually in thin populations. Apparently the species occupy a very limited range, and numerous new taxa are to be expected.

Spirobolellidae have not been reported from Victoria, Tasmania and West Australia. On account of new evidence they may be expected in the eastern part of Victoria. It seems probable that *"Trigoniulus" hemityphlus* Verhoeff, 1924, from Adelaide, is a spirobolellid, rather than a trigoniulid.

Spirobolellidae occur in Indonesia, but they have not been reported from the New Guinea archipelago; a single species was described from New Zealand, but this record needs confirmation. The family is remarkably richly represented in New Caledonia, where it is the only spirobolid group.

Literature

Brölemann, 1913; Chamberlin, 1920a, 1920b; L. Koch, 1867; Verhoeff, 1924, 1928.

Without locality

Strophobolus immigrans Chamberlin, 1920 (T)

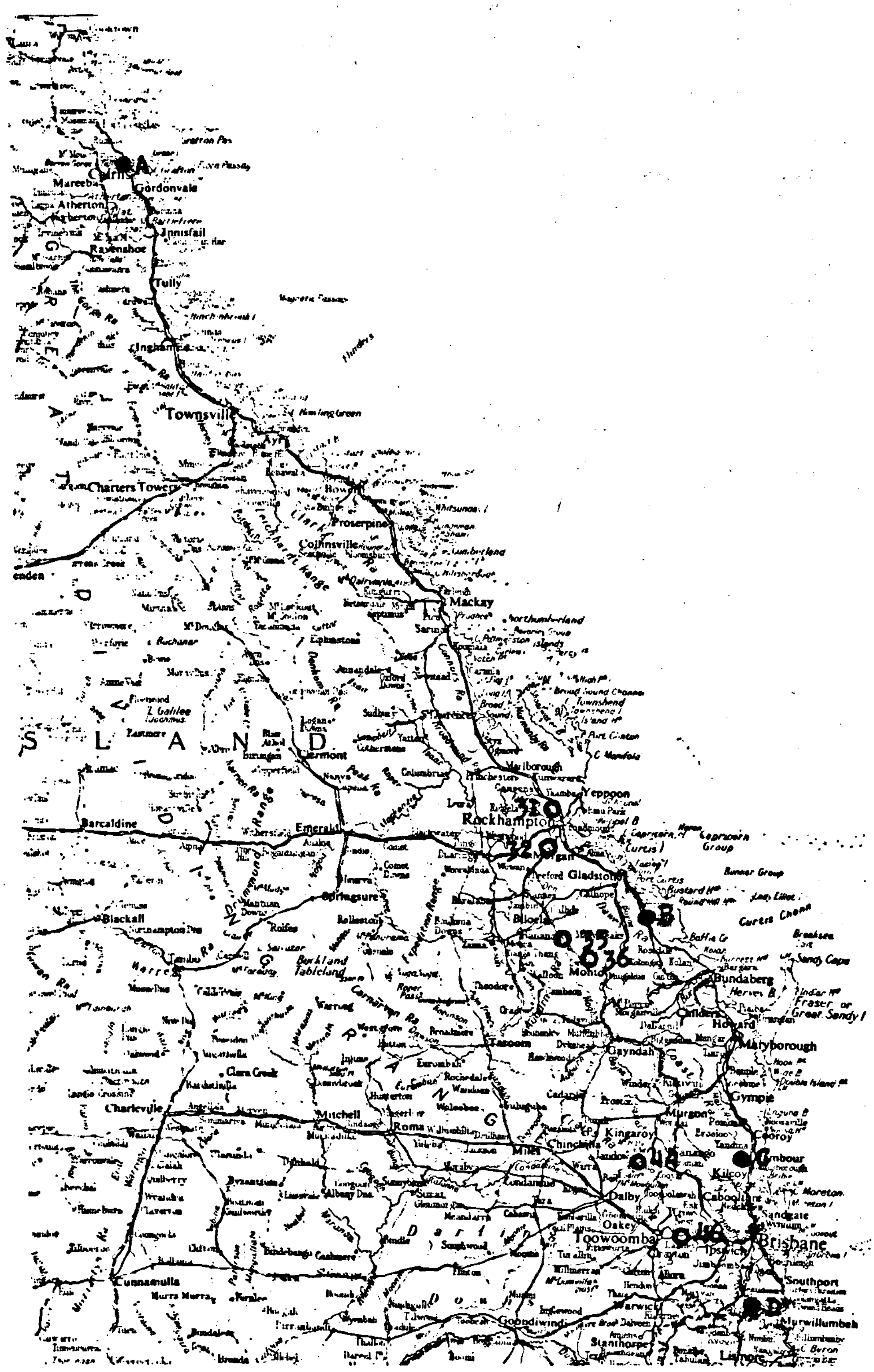
Distribution in Queensland

●: localities of described species

A: Kuranda - *Spirobolellus kurandanus* Chamberlin, 1920 (T)

B: Colosseum - *Queenslandobolus sjoestedti* Verhoeff, 1924 (T)

C: Blackall Range - *Attemsobolus bivittatus* Verhoeff, 1924 (T)
D: Christmas Creek - *Poratobolus mjoebergi* Verhoeff, 1924 (T)
o: localities of collected specimens
Sta. Nr. 31, 32, 35, 36, 44, 46.



Distribution in New South Wales

●: localities of described species

A: Upper Richmond River - *Attemsobolus dorsovittatus* Verhoeff, 1928 (T)

B: Fingal Bay, Port Stephens - *Walesbolus lobatus* Verhoeff, 1928 (T)

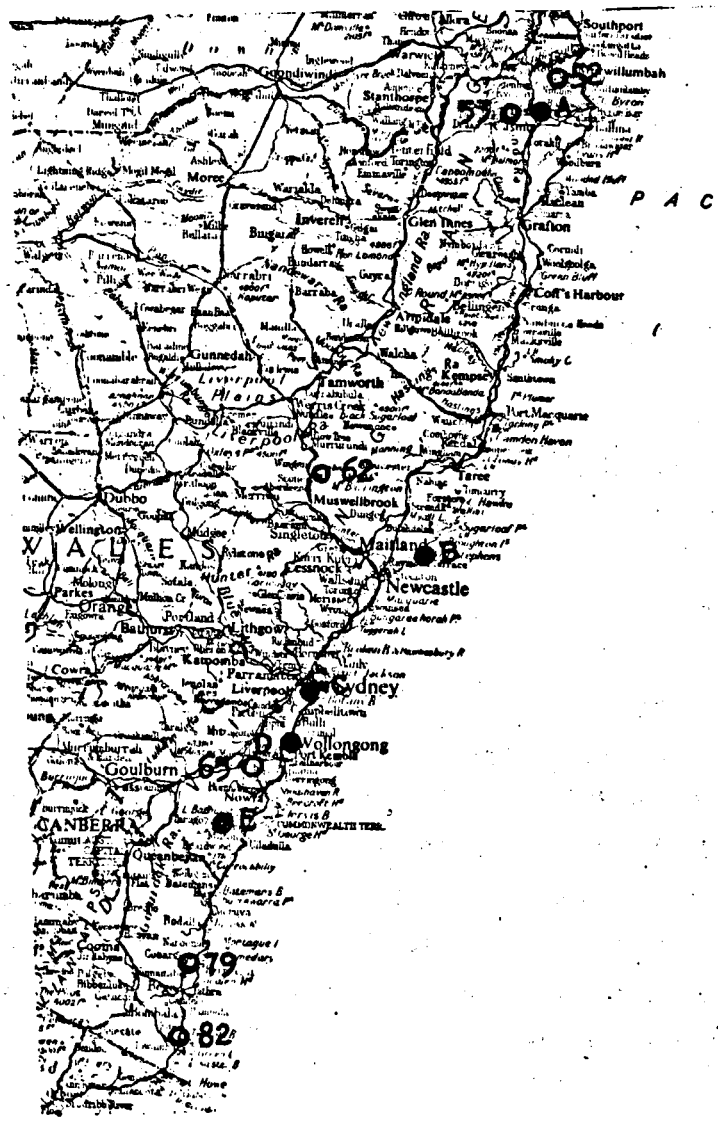
C: Sutherland - *Strophobolus australianus* Chamberlin, 1920 (T)

D: Wollongong - *"Spirobolus" lugubris* L. Koch, 1867 (T)

E: Mt. Sassafras - *Spirobolellus rainbowi* Brölemann, 1913 (T)

o: localities of collected specimens

Sta. Nr. 52, 53, 62, 65, 79, 82.



Spirobolida, Rhinocricidae

Taxonomy

Most of the known Australian species of this family have been described under the generic names of *Rhinocricus* Karsch, 1881, and *Dinematocricus* Brölemann, 1913. However, as far as can be ascertained these genera in the current sense are not represented in Australia. Actually, three generic

categories seem to be involved, i.e. *Cladiscocricus* Brölemann, 1913 (type-species: *Rhinocricus falcatus* Silvestri, 1897), *Adelobolus* Verhoeff, 1924 (type-species: *A. simplex* Verhoeff, 1924) and a third genus the name for which has yet to be proposed. The three are easily distinguished on account of the structure of the posterior gonopods of the male, which in *Cladiscocricus* have the shape of a relatively broad ribbon with a tapering apex and a small straight acuminate inner branch arising from near the base of the telopodite. In *Adelobolus* the posterior gonopods are unbranched, flagellate, whereas in the unnamed category they are distally bifurcate with one branch acuminate and the other distally widening and apically truncate.

Unfortunately, most of the described Australian rhinocricids cannot be referred to either of the three mentioned genera, because they were based on female type material or because their posterior gonopods have not been sufficiently described. It seems however that the third genus is the dominant one.

Distribution

In Australia Rhinocricidae have been reported so far only from an area along the east coast of Queensland from the Cape York peninsula down to the surroundings of Brisbane. Most of the localities are situated quite near the coast, but since rhinocricids are known to be able to stand rather dry climatic conditions they may be expected to reach rather far inland.

The family is also well represented in east Indonesia and the New Guinea archipelago, extending eastward to the Fiji islands. No genera are shared by Australia and New Guinea, and there does not seem to exist a close relationship between the Australian and New Guinea rhin ocricids.

In the course of our journey through Queensland Rhinocricidae were met with only on a few occasions, but they were locally sometimes quite numerous. Species have been found in rainforests, but some appear to favour dry sclerophyllous forests especially on sandy soil. Of particular interest were the conditions under which the specimens on Green Island were found. In spite of the utterly dry soil we found many specimens in the sand under logs, more dead than alive.

Literature

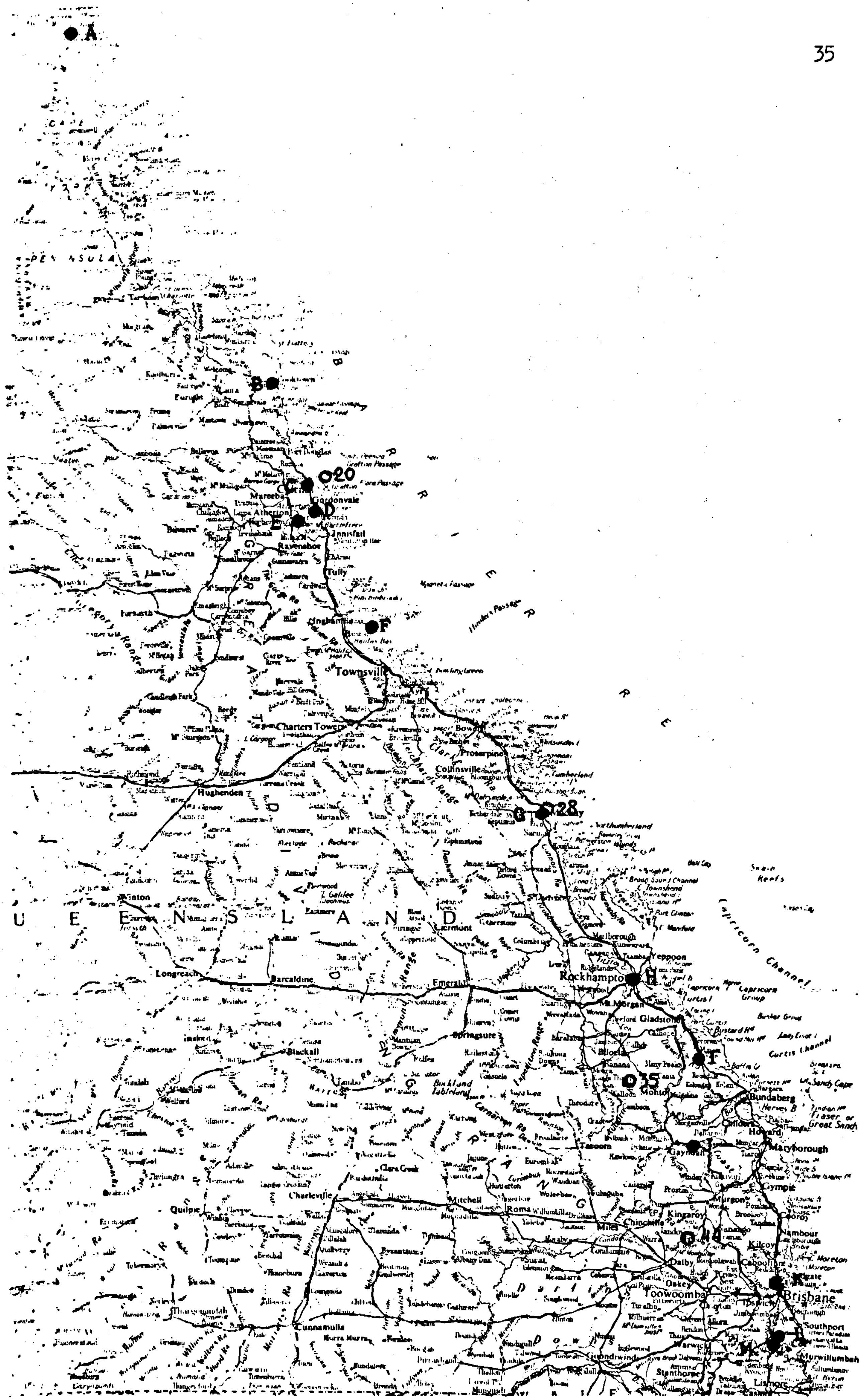
Brölemann, 1913; Chamberlin, 1920b, 1947; Daday, 1891; Karsch, 1881c; Silvestri, 1895, 1897, 1898; Verhoeff, 1924; Voges, 1878.

Without locality

"Spirobolus" fasciculatus Voges, 1878

Distribution in Queensland

●: localities of described species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Mareeba
Atherton
Gordonvale
Innisfail
Ravenshoe
Tully
Ingham
Townsville
Charters Towers
Bowen
Proserpine
Collinsville
Hughenden
Winton
Q U E E N S L A N D
Clermont
Longreach
Barcaldine
Emerald
Rockhampton
Yeppoon
Mt. Morgan
Gladstone
Capricorn Channel
Springsure
Blackall
Bundaberg
Maryborough
Gayndah
Gympie
Kingaroy
Nambour
Charleville
Mitchell
Roma
Miles
Chinchilla
Quilpie
Dalby
Toowoomba
Brisbane
Southport
Cunnamulla
Warwick
Goondiwindi
Stanthorpe
Murwillumbah
Lismore

A: Somerset - *"Rhinocricus" opulentus* Silvestri, 1895 (T)
B: Cooktown - *"Dinematocricus" sinuatulus* Chamberlin, 1920 (T)
C: Cairns - *"Rhinocricus" sennae* Silvestri, 1898 (T)
D: Bellenden Ker - *"Dinematocricus" rotundatus* Verhoeff, 1924 (T)
E: Malanda - *Adelobolus simplex* Verhoeff, 1924 (T 1)
F: Palm Island - *"Rhinocricus" diastatus* Chamberlin, 1947 (T)
G: Mackay - *"Spirobolus (Rhinocricus)" crepidatus* Karsch, 1881 (T)
H: Rockhampton - *"Spirobolus (Rhinocricus)" brevipes* Karsch, 1881 (T)
I: Colosseum - *"Dinematocricus" glabratus* Verhoeff, 1924 (T)
J: Gayndah - *Cladiscocricus falcatus* (Silvestri, 1897) (T)
Cladiscocricus falcatus scobinula Brölemann, 1913 (T)
"Dinematocricus" consimilis Brölemann, 1913 (T)
K: Enoggera, Brisbane - *"Rhinocricus" perditus* Chamberlin, 1920 (T)
L: Mt. Tamborine - *Adelobolus simplex* Verhoeff, 1924 (T 2)
M: Glen Lamington - *Adelobolus transversesulcatus* Verhoeff, 1924 (T)
No locality ("Queensland") - *"Spirobolus" coeruleolimbatus* Daday, 1891 (T)
o: localities of collected specimens
Sta. Nr. 20, 28, 35, 44.

Spirobolida, Trigoniulidae

Taxonomy

Although many Australian species of this family still figure under the generic name of *Trigoniulus* Pocock, 1894, it seems likely that none of them actually belong to this genus in a restricted sense.

Three generic names have been based on Australian members of the family: *Zygostrophus* Chamberlin, 1920 (type-species: *Z. ferruginopes* Chamberlin, 1920), *Ainigmabolus* Verhoeff, 1937 (type-species: *A. chisholmi* Verhoeff, 1937), and *Prionopeza* Attems, 1953 (type-species: *P. serrulata* Attems, 1953)

The characters of the gonopods of the type-species of *Zygostrophus* have not been illustrated. Yet, from the verbal characterization of the genus and the fact that the well-illustrated *Spirostrophus digitulus* Brölemann, 1913, was referred to it, the characters of the genus can be inferred. In the anterior gonopods the genus seems to be characterized by the presence of an abruptly narrowed distal production of the coxal piece, and the typical triangular shape of the apex of the telopodite. The generic characters of the posterior gonopods have yet to be ascertained. It is evident that *Prionopeza* Attems is a junior synonym of *Zygostrophus*.

Ainigmabolus may constitute a second generic category, in particular because the anterior gonopods seem to have a considerably different appearance, but otherwise its distinction from *Zygostrophus* is not yet clarified.

At the moment the conclusion must be that probably a majority of the Australian Trigoniulidae belong to the genus *Zygostrophus*, and that the position of *Ainigmabolus* has yet to be defined. Re-examination of the type-material of the so-called *Trigoniulus* species (e.g. *"Trigoniulus" targionii* Silvestri, 1898) may eventually reveal the existence of a third generic category.

Distribution

In eastern Australia Trigoniulidae have been reported from Cape York peninsula down to Hazelbrook in the Blue Mountains, N.S.W. Outside this range *"Trigoniulus" hemityphlus* Verhoeff, 1924, has been described from Adelaide, South Australia. However, this species, which was based on a single immature male, may in fact belong to the family Spirobolellidae, since several points in its diagnosis seem to indicate that it is quite different from the other Australian trigoniulids.

Trigoniulidae have not been recorded from West Australia, but the family is well-represented in the New Guinea archipelago. The relationship between the New Guinea and Australian forms remains to be established.

During our journey Trigoniulidae were collected at various localities in Queensland, but the number of specimens obtained was small. They were found in rainforests, as well as in the sclerophyllous forests, and may be more numerous in the latter biotope. As juliform millipedes they may have acquired a certain resistence against drought, and it will be interesting to define their range towards the drier inlands.

In New South Wales specimens were more numerous, probably under influence of more favourable weather conditions, especially in the New England area. Unfortunately, we were not able to confirm the presence of the family in the wider surroundings of Sydney. It seems likely, however, that Trigoniulidae do not occur in southeastern N.S.Wales, and it seems very probable indeed that they are lacking completely in Victoria and Tasmania.

Literature

Attems, 1898a, 1953; Brölemann, 1913; Chamberlin, 1920b; Silvestri, 1895, 1898; Verhoeff, 1924, 1928, 1937.

Distribution in Queensland

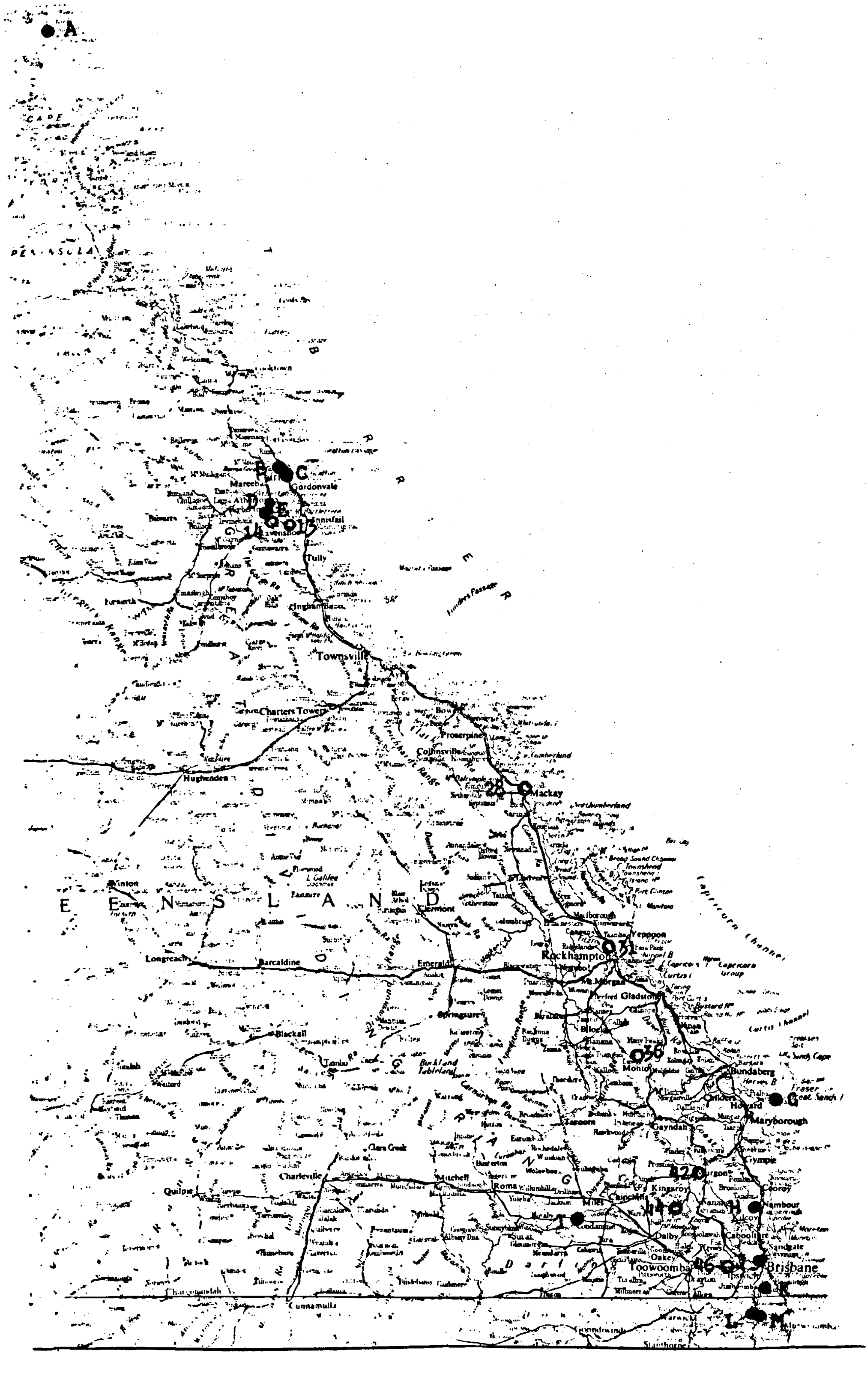
●: localities of described species

A: Somerset - *"Trigoniulus" formosus* Silvestri, 1895 (T)

B: Kuranda - *Zygostrophus ferruginopes* Chamberlin, 1920 (T)

C: Cairns - *"Trigoniulus" targionii* Silvestri, 1898 (T)

D: Atherton - *"Trigoniulus" insculptus* Verhoeff, 1924 (T 1)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CAPE
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Cooktown
Mareeba
Gordonvale
Innisfail
Tully
Townsville
Charters Towers
Hughenden
Bowen
Proserpine
Collinsville
Mackay
Winton
E E N S L A N D
Longreach
Barcaldine
Emerald
Clermont
Blackall
Springsure
Tambo
Rockhampton
Yeppoon
Mt. Morgan
Gladstone
Biloela
Monto
Bundaberg
Howard
Maryborough
Gayndah
Gympie
Kingaroy
Nambour
Caboolture
Brisbane
Ipswich
Toowoomba
Dalby
Miles
Roma
Mitchell
Charleville
Quilpie
Cunnamulla
Taroom
Chinchilla
Stanthorpe

E: Herberton - *"Trigoniulus" insculptus* Verhoeff, 1924 (T 2)

') F: Cedar Creek - *"Trigoniulus" insculptus* Verhoeff, 1924 (T 3)

G: Fraser Island - *Zygostrophus digitulus* (Brölemann, 1913) (T 1)

H: Blackall Range - *Zygostrophus digitulus* (Brölemann, 1913)
"Trigoniulus" insculptus blackalensis Verhoeff, 1924 (T)

I: Condamine - *Zygostrophus digitulus* (Brölemann, 1913) (T 2)

J: Toowong ("Toorwary"), Brisbane - *Zygostrophus alternans* Chamberlin, 1920 (T)

K: Mt. Tamborine - *Zygostrophus digitulus* (Brölemann, 1913)

L: Glen Lamington - *Zygostrophus digitulus* (Brölemann, 1913)

M: Christmas Creek - *Zygostrophus digitulus* (Brölemann, 1913)

No locality ("Burnett District") - *"Trigoniulus" comma* (Attems, 1898) (T)
"Trigoniulus" burnetticus (Attems, 1898) (T)

No locality ("Queensland") - *Zygostrophus serrulatus* (Attems, 1953) (T)

o: localities of collected specimens
Sta. Nr. 13, 14, 28, 31, 36, 42, 44, 46

Distribution in New South Wales

●: localities of described species

A: Upper Richmond River - *Zygostrophus digitulus richmondanus* (Verhoeff, 1928) (T)
"Trigoniulus" hebes Verhoeff, 1928 (T)

B: Salisbury Court, near Uralla - *Zygostrophus urallanus* Chamberlin, 1920 (T)

C: Comboyne - *Ainigmabolus chisholmi* Verhoeff, 1937 (T)

D: Hazelbrook - *"Trigoniulus" montium* Verhoeff, 1928 (T)

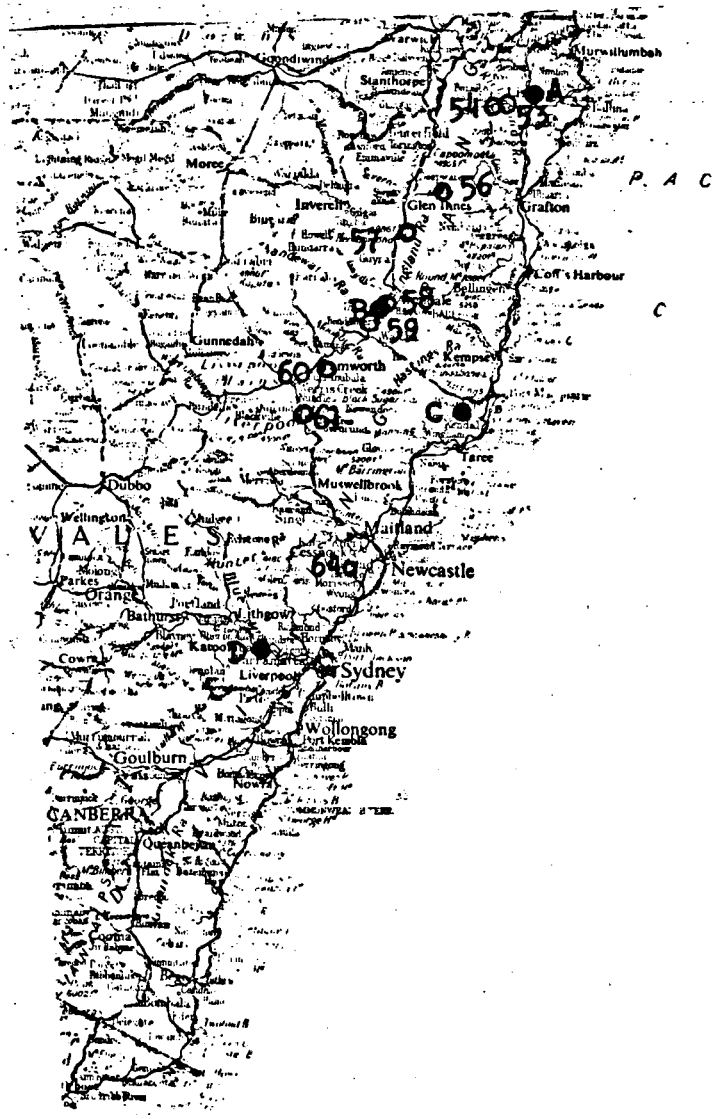
o: localities of collected specimens
Sta. Nr. 53, 54, 56, 57, 58, 59, 60, 61, 64.

Spirostreptida, Cambalidae and Iulomorphidae

Taxonomy

Species of the suborder Cambalidea of the order Spirostreptida have been recorded from localities in eastern Australia and Tasmania as well as in West Australia, and have been referred to the two families, Cambalidae and Iulomorphidae. To the Cambalidae belong *Dimerogonus* Attems, 1903 (type-species: *D. orophilus* Attems, 1903) and *Proscelomerion* Verhoeff, 1924 (type-species: *P. serratum* Verhoeff, 1924); to the Iulomorphidae *Thaumaceratopus* Verhoeff, 1924 (type-species: *T. cervinus* Verhoeff, 1924), *Amastigogonus*

') *geographical position to be established, see p. 22.*



Brölemann, 1913 (type-species: *A. tasmanianus* Brölemann, 1913), *Victoriocambala* Verhoeff, 1944 (type-species: *V. buffalensis* Verhoeff, 1944), *Meriproscelum* Verhoeff, 1924 (type-species: *M. penicilligerum* Verhoeff, 1924), and a number of endemic genera in West Australia.

Most of the species and genera which have been described from the eastern part of the continent and Tasmania have been well characterized, but unfortunately there are a number of older descriptions - those referred to the genera *Julus* Linnaeus, 1758, *Iulomorpha* Porat, 1872, and *Spirostreptus* Brandt, 1833 - which are insufficient for the recognition of the species.

Distribution

As far as known the Cambalidae in Australia are confined to the eastern part of the continent, whereas the Iulomorphidae have been reported from all over the continent and Tasmania. Since all the described species have been recorded only from their type locality, and since our investigations have shown that Cambalidea are much more common than might be assumed from the data in literature, little can be said on the distribution of the genera and species. It seems likely that the group is more dominant in the faunae

of Victoria and Tasmania than in the more northern states, where the occurrence may be more local.

Cambalidae have been reported from New Zealand; it is not known whether the Iulomorphidae are represented there too. The New Guinea archipelago lacks both families.

Literature

Attems, 1903; Brölemann, 1913; Chamberlin, 1920b; Gervais, 1847; Hoffman, 1972; L. Koch, 1867; Silvestri, 1897, 1898; Verhoeff, 1924, 1944.

Distribution in Queensland

●: localities of described species

A: Cairns - *"Iulomorpha" podenzanae* Silvestri, 1898 (T)
"Iulomorpha" pallipes Silvestri, 1898 (T)

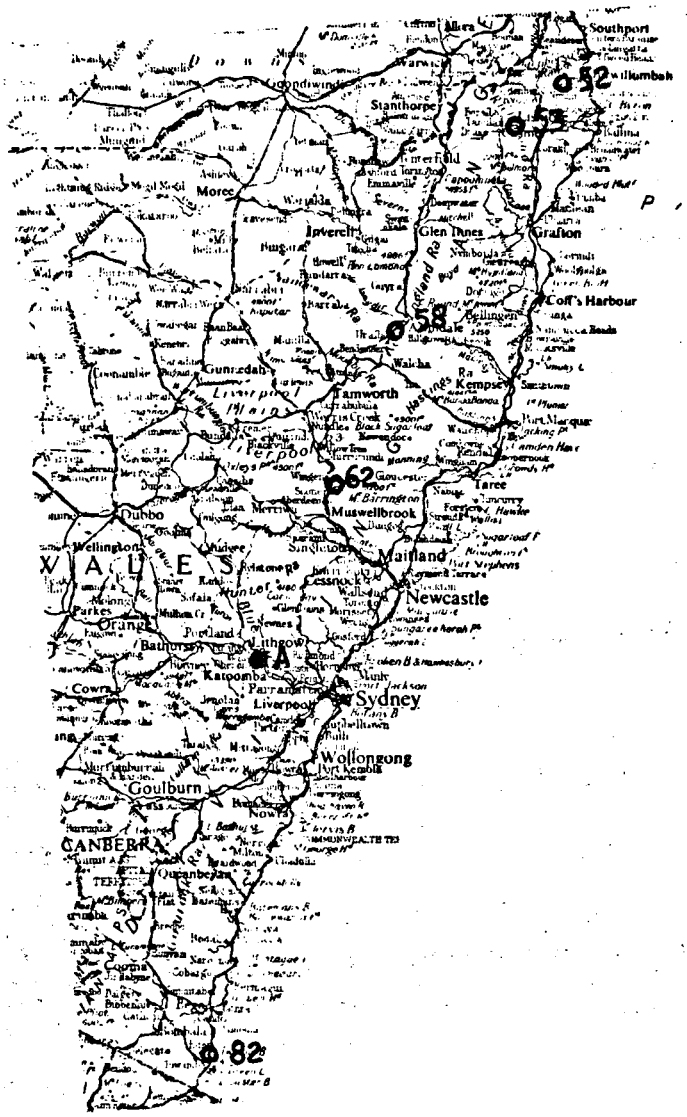
') B: Cedar Creek - *Thaumaceratopus cervinus* Verhoeff, 1924 (T)
Thaumaceratopus elongatus Verhoeff, 1924 (T)

C: Gayndah - *"Julomorpha" flagelligera* Silvestri, 1897 (T)

D: Blackall Range - *Merioproscelum penicilligerum* Verhoeff, 1924 (T)
Proscelomerion serratum Verhoeff, 1924 (T)

E: Brisbane - *"Spirostreptus" maritimus* L. Koch, 1867 (T)
"Spirostreptus" impressopunctatus L. Koch, 1867 (T)

o: localities of collected specimens
Sta. Nr. 35, 44, 45, 50.



') *geographical position to be established, see p. 22.*

Distribution in New South Wales

●: locality of described species

A: Blue Mountains near Sydney - *Dimerogonus orophilus* Attems, 1903 (T)

o: localities of collected specimens

Sta. Nr. 52, 53, 58, 62, 82.

Distribution in Victoria

●: locality of described species

A: Mt. Buffalo ') - *Victoriocambala buffalensis* Verhoeff, 1944 (T)

o: localities of collected specimens

Sta. Nr. 84, 87, 88, 91, 92, 93.

Distribution in Tasmania

●: localities of described species

A: Lake Leake - *Amastigogonus fossuliger* Verhoeff, 1944 (T)

B: slopes of Mt. Wellington - *"Julus" verreauxii* Gervais, 1847 (T)

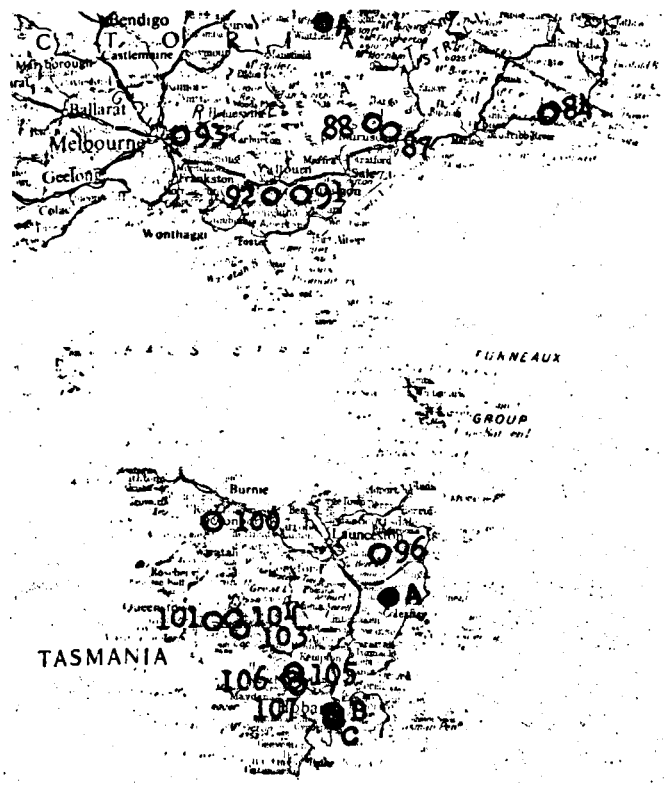
C: Mt. Nelson - *Amastigogonus hardyi* (Chamberlin, 1920)

No locality - *Amastigogonus tasmanianus* Brölemann, 1913 (T)

Amastigogonus hardyi (Chamberlin, 1920) (T)

o: localities of collected specimens

Sta. Nr. 96, 100, 101, 103, 104, 105, 106, 107, 108.



') *Verhoeff cited the locality of this species as "Bei Viktoria auf Tasmania, am Mt. Buffalo". A place and mountain with these names are not known in Tasmania (Miss Alison Green, in litt.), and it seems much more likely that the material was actually collected in the Mt. Buffalo Natn. Park in Victoria.*

Craspedosomatida

Taxonomy

In the Australian region this order has been recorded so far only from New Zealand, where it is represented by the family Schedotrigonidae. We collected specimens at a single locality in New South Wales and at four localities in Tasmania, and these constitute the first records of the order for Australia proper. The classificatory status of this material has yet to be ascertained.

Distribution

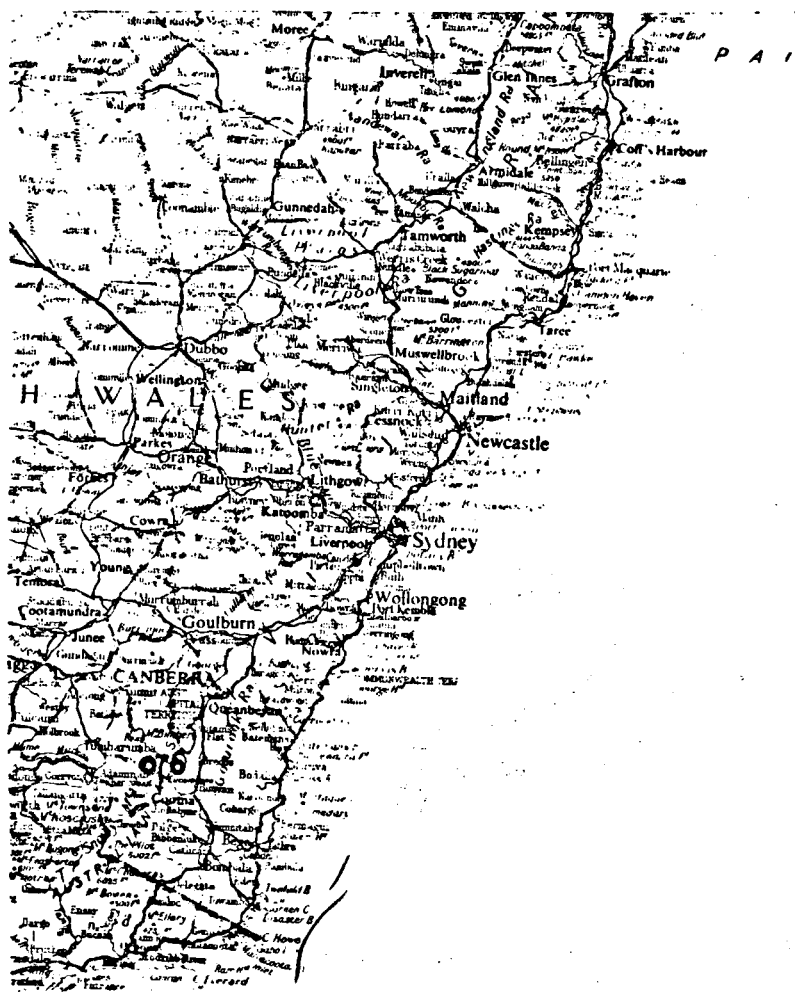
The tiny millipedes of this order are usually very susceptible to drought and can be found only when the weather conditions are suitable. Our material was obtained from humus and from moulded logs at relatively humid localities.

It seems likely that the members of this order are confined to the southern part of New South Wales, Victoria and Tasmania.

Distribution in New South Wales

o: locality of collected specimens

Sta. Nr. 76.



Distribution in Tasmania

o: localities of collected specimens
Sta. Nr. 100, 104, 105, 107.

Polydesmida, Paradoxosomatidae

Taxonomy

In Australia this family is represented only by two of the three tribes of the subfamily Australiosomatinae, the Australiosomatini and the Antichiropodini. As far as the number of described species is concerned, this group appears to be the dominant family of diplopods in the fauna of Australia. On account of a certain "popularity" among students of diplopods in the past, the taxonomy of the Paradoxosomatidae is relatively well worked out.

In Queensland the Australiosomatini are represented by species of the genera *Streptocladosoma* Jeekel, 1980 (type-species: *S. dissimile* Jeekel, 1980), *Heterocladosoma* Jeekel, 1968 (type-species: *Eustronqylosoma bifalcatum* Silvestri, 1898), *Paraustraliosoma* Verhoeff, 1924 (type-species: *P. malandense* Verhoeff, 1924), and *Phyllocladosoma* Jeekel, 1968 (type-species: *Dicladosoma annulatipes* Verhoeff, 1924).

Phyllocladosoma crosses the border towards New South Wales, and is joined there by the genera *Myallosoma* Verhoeff, 1928 (type-species: *M. hamuligerum* Verhoeff, 1928), *Gigantowales* Verhoeff, 1937 (type-species: *G. chisholmi* Verhoeff, 1937), *Australiosoma* Brölemann, 1913 (type-species: *A. rainbowi* Brölemann, 1913), *Cladethosoma* Chamberlin, 1920 (type-species: *Australiosoma clarum* Chamberlin, 1920), *Hoplatessara* Verhoeff, 1928 (type-species: *H. musgravei* Verhoeff, 1928), *Akamptogonus* Attems, 1914 (type-species: *Polydesmus novarae* Humbert & De Saussure, 1869), and *Dicladosoma* Brölemann, 1913 (type-species: *Australiosoma etheridgei* Brölemann, 1913).

In Victoria *Hoplatessara* and *Cladethosoma* are also represented, and this state has in addition the genus *Hoplatria* Verhoeff, 1941 (type-species: *H. clavigera* Verhoeff, 1941).

The Antichiropodini of Queensland have been referred to the genera *Australodesmus* Chamberlin, 1920 (type-species: *A. divergens* Chamberlin, 1920), *Aulacoporus* Verhoeff, 1924 (type-species: *A. castaneus* Verhoeff, 1924), *Pseudostrongylosoma* Verhoeff, 1924 (type-species: *P. sjoestedti* Verhoeff, 1924), *Mjoebergodesmus* Verhoeff, 1924 (type-species: *M. annulatus* Verhoeff, 1924), *Brochopeltis* Verhoeff, 1924 (type-species: *B. mjoebergi* Verhoeff, 1924) *Helicopodosoma* Verhoeff, 1924 (type-species: *H. vittigerum* Verhoeff, 1924), and the enigmatic genus *Atropisoma* Silvestri, 1897 (type-species: *A. elegans* Silvestri, 1897). *Aulacoporus* extends its range into New South Wales, which state otherwise has the endemic genera *Walesoma* Verhoeff, 1928 (type-species: *W. helmsii* Verhoeff, 1928) and *Parwalesoma* Verhoeff, 1937 (type-species: *P. castaneum* Verhoeff, 1937).

Victoria has only the genus *Pogonosternum* Jeekel, 1965 (type-species: *Strongylosoma nigrovirgatum* Carl, 1902), and Tasmania *Notodesmus* Chamberlin, 1920 (type-species: *N. scotius* Chamberlin, 1920).

With the exception of some species described by L. Koch, Karsch, Silvestri, Attems and Chamberlin, still referred to the obviously wrong generic names of *Strongylosoma* Brandt, 1833, and *Eustrongylosoma* Silvestri, 1896, most of the known genera and species of Australian paradoxosomatids are well characterized.

Distribution

Whereas the tribus Australiosomatini is confined to the east coast of continental Australia, from the Cape York peninsula down to Victoria, the Antichiropodini is represented in all suitable places of the continent as well as in Tasmania.

From the available evidence one may conclude that the Antichiropodini is particularly well represented in Queensland, less so in New South Wales and little in Victoria and Tasmania. This picture may be biased by undercollecting of large areas, but was largely substantiated by our own results.

On the other hand the Australiosomatini seems relatively less represented in Queensland as compared to New South Wales. It is interesting to note that the Queensland fauna seems to be characterized by genera which have the most complicated male gonopods in the tribe (e.g. *Streptocladosoma, Heterocladosoma, Paraustraliosoma*), whereas a simple type of genitalia, such as in *Akamptogonus* and *Australiosoma*, is found only in the southern part of the range of the group.

Paradoxosomatidae occur in thin populations in the rainforests, but it

has become evident to us that many species prefer the more open Eucalyptus forests, where under the right weather conditions they may be found in fairly large numbers. It seems probable, therefore, that the family occupies a much broader zone along the east coast of Australia than the available data suggest, and it will be interesting to investigate the distributional limits of the group towards the dry inner territories of Australia.

Tasmania has one described paradoxosomatid. Some more species are represented in our collection. In spite of favourable conditions elsewhere on the island, these were found only in the eastern half.

The subfamily Australiosomatinae is known to occur also in the New Guinea archipelago, where it is represented by the tribus Aschistodesmini, which seems to have its center of diversity in the Solomon islands. New Zealand has no endemic species; the occurrence of *Akamptogonus novarae* there must be due to importation from Australia. A single species of the genus *Aulacoporus*, *A. pruvotae* (Brölemann, 1931), has been described from New Caledonia. There is little doubt that this must be a recent interloper originating from Queensland, although as yet it has not been recorded from the mainland.

Literature

Attems, 1898a, 1898b, 1931, 1937, 1940; Brölemann, 1913; Carl, 1902; Chamberlin, 1920b; Jeekel, 1956, 1965, 1968, 1979, 1980; Karsch, 1881b; L. Koch, 1865, 1867; Lucas, 1840; Newport, 1844; Pocock, 1893; Silvestri, 1895, 1897, 1898; Verhoeff, 1924, 1928, 1937, 1941.

Without locality

"Strongylosoma" gervaisii (Lucas, 1840) (T)

"Strongylosoma" trilineatum Newport, 1844 (T)

Distribution in Queensland

●: localities of described species

A: Iron Range - *Streptocladosoma dissimile* Jeekel, 1980 (T)

B: Kuranda - *Australodesmus divergens* Chamberlin, 1920 (T)

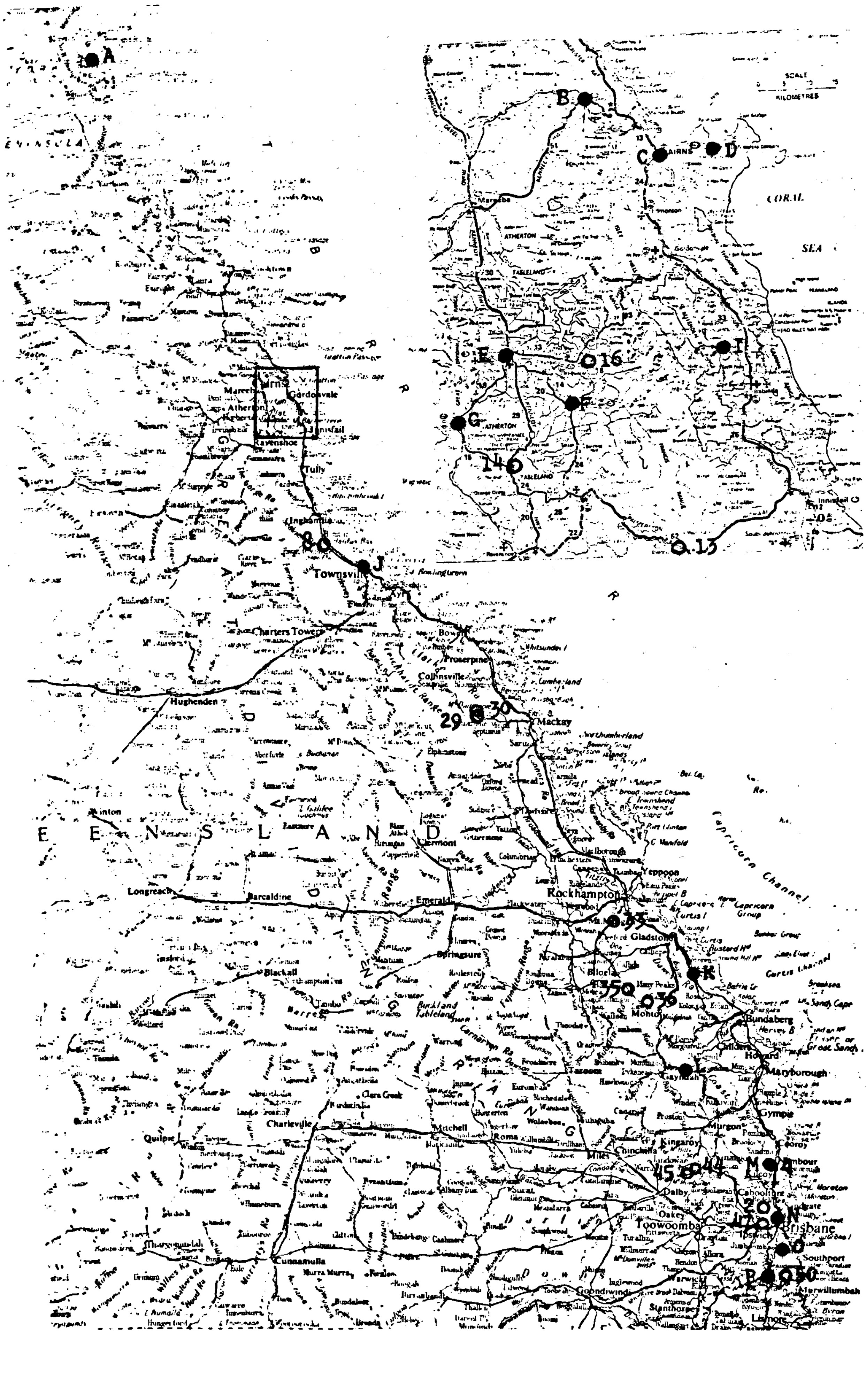
C: Cairns - *Heterocladosoma bifalcatum* (Silvestri, 1898) (T)

D: Yarrabah - *Aulacoporus yarrabahnus* Verhoeff, 1924 (T)

E: Atherton - *Pseudostrongylosoma sjoestedti* Verhoeff, 1924 (T)
Mjoebergodesmus annulatus Verhoeff, 1924 (T 1)
Brochopeltis mjoebergi Verhoeff, 1924 (T 1)

F: Malanda - *Mjoebergodesmus annulatus* Verhoeff, 1924 (T 2)
Paraustraliosoma malandense Verhoeff, 1924 (T 1)
Aulacoporus castaneus Verhoeff, 1924 (T 1)

G: Herberton - *Aulacoporus affinis* Verhoeff, 1924 (T)
Paraustraliosoma malandense Verhoeff, 1924 (T 2)
Helicopodosoma vittigerum Verhoeff, 1924 (T)
Brochopeltis mjoebergi Verhoeff, 1924 (T 2)


A
B
C
CAIRNS
D
E
16
F
G
14
I
13
SCALE
KILOMETRES
CORAL
SEA
ATHERTON
TABLELAND
Mareeba
Cairns
Gordonvale
Atherton
Ravenshoe
Innisfail
Tully
Ingham
80
J
Townsville
Charters Towers
Hughenden
Bowen
Proserpine
Collinsville
29
30
Mackay
Winton
Q U E E N S L A N D
Clermont
Longreach
Barcaldine
Emerald
Rockhampton
Yeppoon
Capricorn Channel
Gladstone
K
Biloela
35
36
Monto
Blackall
Springsure
Tambo
Bundaberg
Gayndah
Maryborough
Gympie
Charleville
Quilpie
Mitchell
Roma
Chinchilla
Kingaroy
Miles
45
44
M
4
Dalby
Oakey
Toowoomba
20
12
N
Brisbane
Ipswich
Southport
P
50
Cunnamulla
Warwick
Goondiwindi
Stanthorpe
Murwillumbah
Lismore

') H: Cedar Creek - *Aulacoporus castaneus* Verhoeff, 1924 (T 2)
Mjoebergodesmus annulatus Verhoeff, 1924 (T 3)
Brochopeltis mjoebergi Verhoeff, 1924 (T 3)

I: Bellenden Ker - *Brochopeltis mjoebergi queenslandica* Verhoeff, 1924 (T)

J: Townsville - *Streptocladosoma albovittatum* Jeekel, 1980 (T)

K: Colosseum - *Aulacoporus teres* (Verhoeff, 1924) (T)
Heterocladosoma bifalcatum (Silvestri, 1898)

L: Gayndah - *Atropisoma elegans* Silvestri, 1897 (T)
"Eustrongylosoma" transversefasciatum Silvestri, 1897 (T)

M: Blackall Range - *Heterocladosoma hamuligerum* (Verhoeff, 1924) (T)

N: Brisbane - *Aulacoporus annulatus* (Verhoeff, 1941) (T)
Phyllocladosoma broelemanni (Verhoeff, 1941) (T)
Heterocladosoma transversetaeniatum (L. Koch, 1867) (T)
"Strongylosoma" asperum L. Koch, 1867 (T)
"Strongylosoma" dubium L. Koch, 1867 (T)
"Strongylosoma" rubripes L. Koch, 1867 (T)

O: Mt. Tamborine - *Aulacoporus vittatus* (Verhoeff, 1924) (T)
Phyllocladosoma annulatipes (Verhoeff, 1924) (T 1)

P: Glen Lamington - *Aulacoporus vittatus dorsalis* (Verhoeff, 1924) (T)
Phyllocladosoma annulatipes (Verhoeff, 1924) (T 2)

No locality ("Burnett District") - *"Strongylosoma" semoni* Attems, 1898 (T)

o: localities of collected specimens

Sta. Nr. 2, 4, 8, 13, 14, 16, 29, 30, 33, 35, 36, 44, 45, 47, 50

Distribution in New South Wales

●: localities of described species

A: Upper Richmond River - *Walesoma helmsii* Verhoeff, 1928 (T)
Aulacoporus rubriventris (Verhoeff, 1928) (T)
Phyllocladosoma annulatipes (Verhoeff, 1924)

B: North Dorrigo - *Aulacoporus sulcatus* (Verhoeff, 1928) (T)
Aulacoporus walesius (Verhoeff, 1928) (T)
Phyllocladosoma andersoni dorrigense (Verhoeff, 1928) (T)

C: Comboyne - *Parwalesoma castaneum* Verhoeff, 1937 (T)
Myallosoma furculigerum Verhoeff, 1937 (T)
Gigantowales chisholmi Verhoeff, 1937 (T)
Cladethosoma cruciatum Verhoeff, 1937 (T)

D: Boolambayte, Myall Lakes - *Phyllocladosoma andersoni* (Verhoeff, 1928) (T)
Myallosoma hamuligerum Verhoeff, 1928 (T)

E: between Mt. Victoria and Jenolan Caves - *Australiosoma michaelseni* (Attems, 1931) (T)

') *geographical position to be established, see p. 22.*

Hoplatessara anulata (Attems, 1931) (T)

F: Katoomba - *"Strongylosoma" robustior* Chamberlin, 1920 (T)

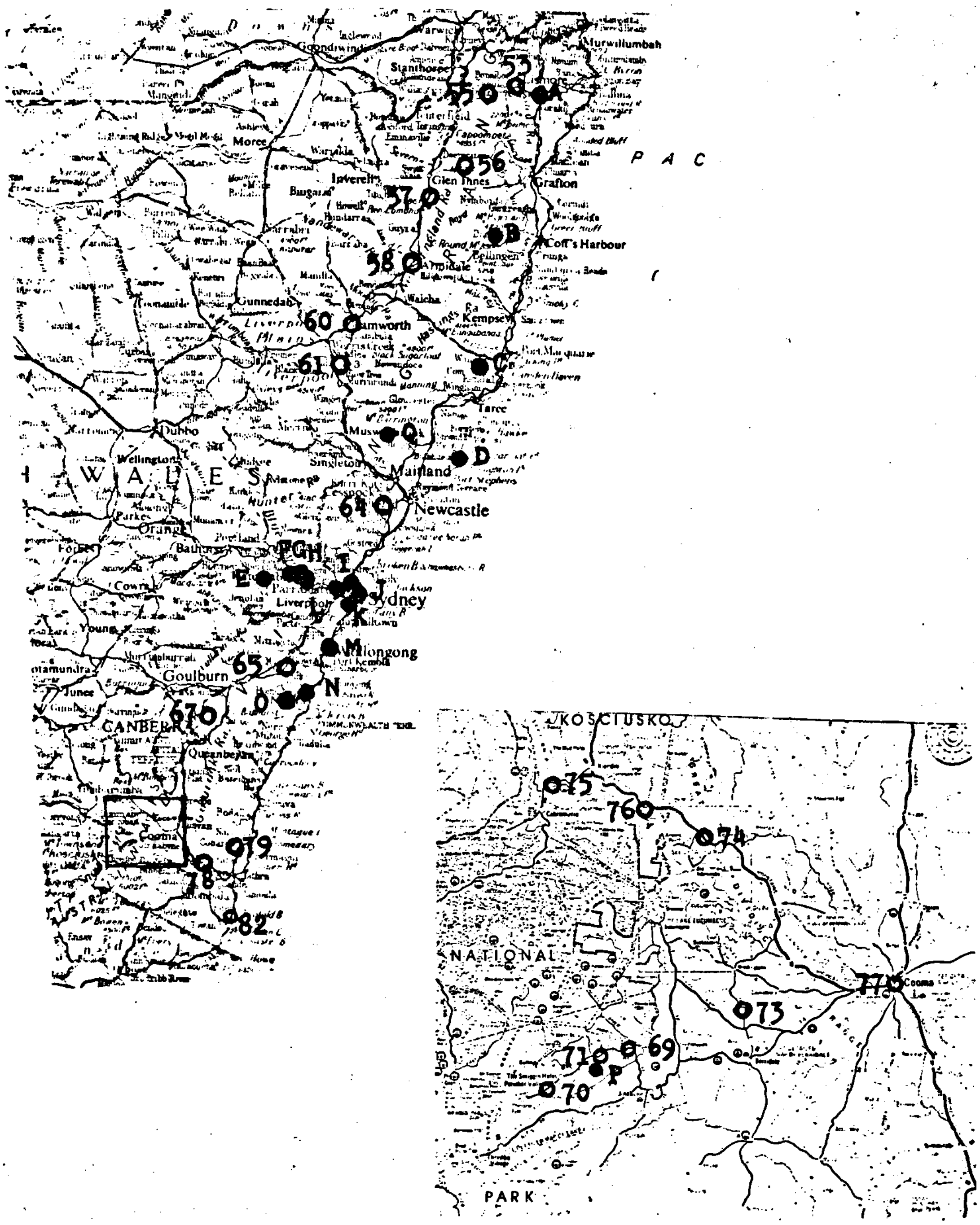
G: Wentworth Falls - *"Strongylosoma" rubrimarginatum* Chamberlin, 1920 (T)

H: Hazelbrook - *Hoplatessara musgravei* Verhoeff, 1928 (T)

I: Hornsby - *Cladethosoma clarum* (Chamberlin, 1920) (T)

J: Sydney - *Cladethosoma clarum* (Chamberlin, 1920)

"Strongylosoma" sagittarium Karsch, 1881 (T)



K: Sutherland - *Akamptogonus novarae* (Humbert & De Saussure, 1869)
"Strongylosoma" quaesitum Chamberlin, 1920 (T)
"Strongylosoma" nigrum Chamberlin, 1920 (T)
L: Paramatta - *"Strongylosoma" trilineatum* (Newport, 1844)
M: Wollongong - *"Strongylosoma" petersii* L. Koch, 1865) (T)
N: Nowra - *Australiosoma clavigerum* (Verhoeff, 1928) (T)
O: Mt. Sassafras - *Australiosoma rainbowi* Brölemann, 1913 (T)
Hoplatessara froggatti (Brölemann, 1913) (T)
P: Pretty Point, Mt. Kosciusko - *Dicladosoma etheridgei* (Brölemann, 1913) (T)
Akamptogonus kosciuskovagus (Brölemann, 1913) (T)
Q: Duggan's Gully, Upper Chichester - *Cladethosoma lucidum* (Verhoeff, 1928) (T)
No locality - *Hoplatessara clavigera* Verhoeff, 1928 (T)
Hoplatessara luxuriosa (Silvestri, 1895) (T)

o: localities of collected specimens
Sta. Nr. 53, 55, 56, 57, 58, 60, 61, 64, 65, 67, 69, 70, 71, 73, 74, 75, 76, 77, 78, 79, 82.

Distribution in Victoria

●: localities of described species
A: Whittlesea - *Hoplatessara pugiona* Verhoeff, 1941 (T)
B: Melbourne - *Pogonosternum nigrovirgatum* (Carl, 1902) (T)
No locality ("Gippsland") - *Hoplatria clavigera* Verhoeff, 1941 (T)
Cladethosoma forceps (Verhoeff, 1941) (T)
Pogonosternum coniferum Jeekel, 1965 (T)

o: localities of collected specimens
Sta. Nr. 84, 85, 86, 87, 88, 89, 90, 92, 93.

Distribution in Tasmania

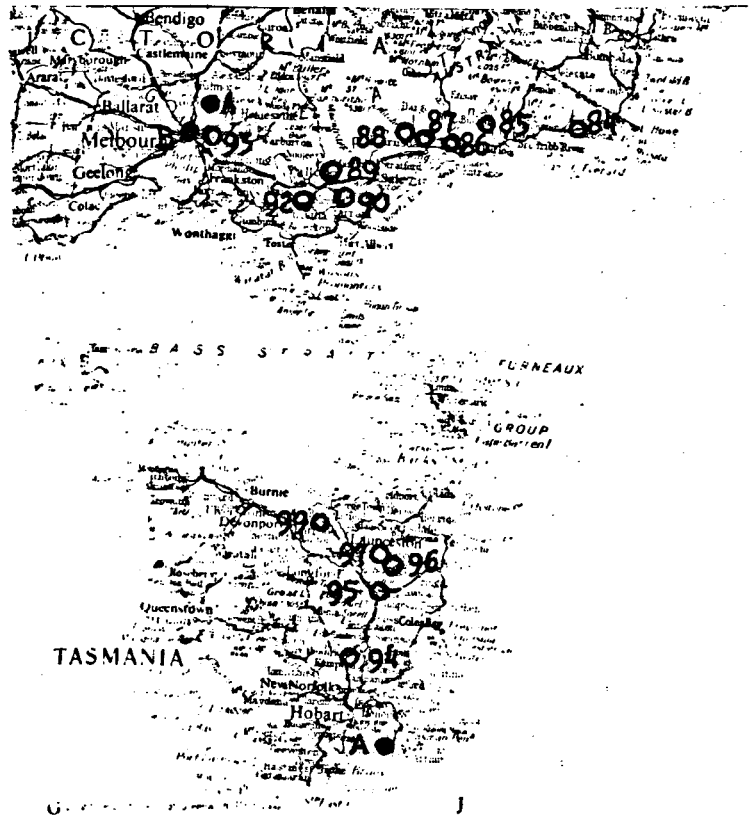
●: locality of described species
A: Wedge Bay - *Notodesmus scotius* Chamberlin, 1920) (T)

o: localities of collected specimens
Sta. Nr. 94, 95, 96, 97, 99.

Polydesmida, Dalodesmidae

Taxonomy

Non-paradoxosomatid Polydesmida have been recorded from West Australia and from widely scattered localities in eastern Australia and Tasmania. Probably all these taxa belong to the family Dalodesmidae, but some descriptions have been insufficiently complete for a definite conclusion.



From eastern Australia and Tasmania eight genera and as many species have been described, but this obviously represents only a minor fraction of the existing dalodesmid fauna.

In Queensland we have the genus *Paurodesmus* Chamberlin, 1920, which is probably the same as *Queenslandesmus* Verhoeff, 1924. The two species have been described from the Atherton tableland.

From New South Wales and Victoria only one genus and species each have been described, from Tasmania five genera and species.

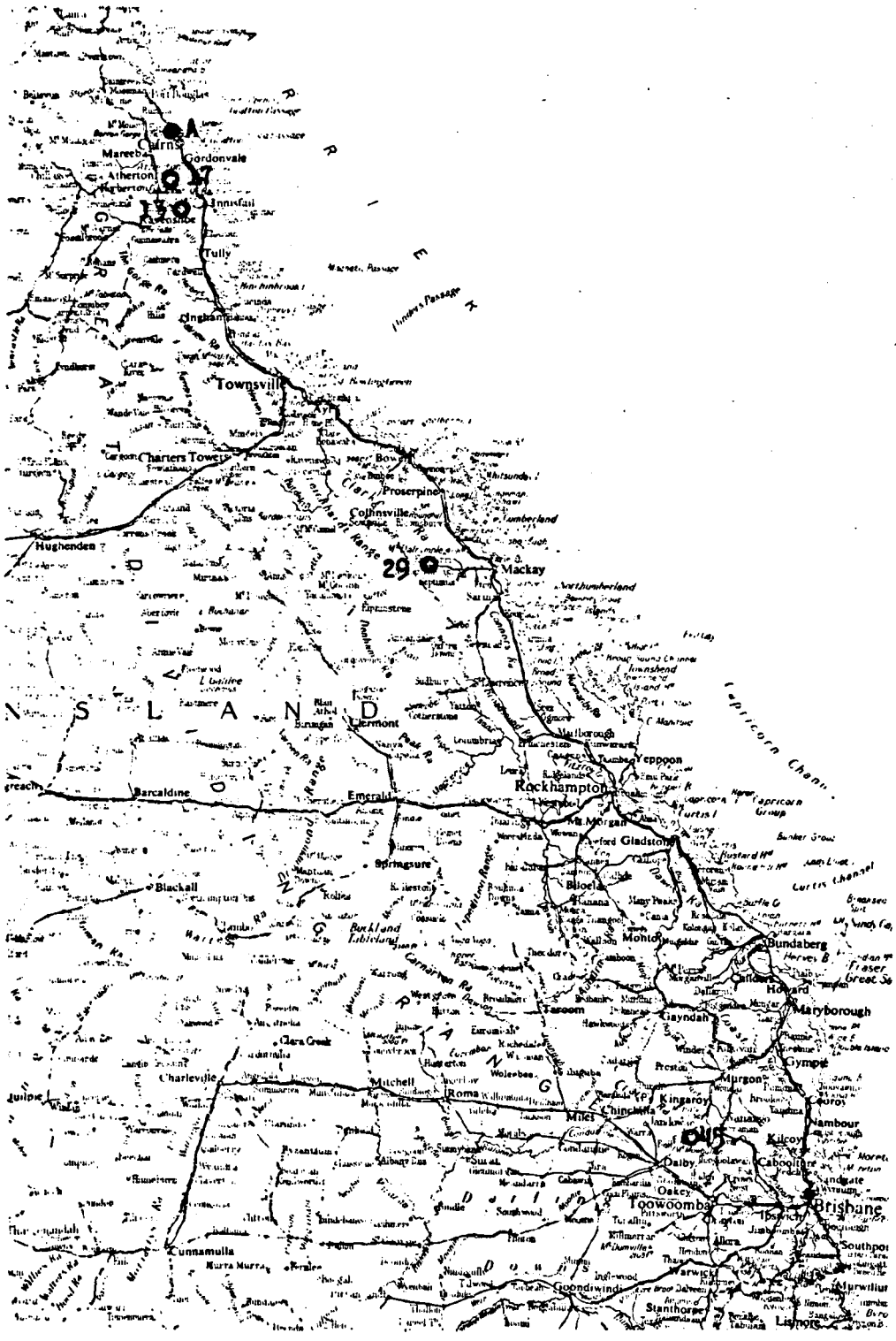
Owing to the scanty knowledge of the group, and because some genera and species have not been adequately described, little can be said on the internal classification of the group.

It is a point of interest that no cryptodesmoid Polydesmida have been recorded from Australia, since this type of polydesmids is well represented in all other southern continents. In connection with this perhaps it is of importance to record the discovery of a species of Polydesmida which looks quite different from the prevailing dalodesmid type, among others because of the heavy incrustation of soil particles on the integument.

Distribution

From the available evidence it is clear that Dalodesmidae occur all along the east coast of Australia and in Tasmania. Sparse samples were collected by us in Queensland, and these were taken either in rainforests or in the wetter type of sclerophyllous forests when sufficient leaflitter

was present to provide cover. No material was taken in New South Wales, except in the Snowy Mountains. The group became more prominent in samples from Victoria, and particularly from Tasmania. It is, however, impossible to say that these results are indicative of the relative representation of Dalodesmidae in the regions of the Australian east coast, since they



were strongly biassed by the dry conditions in Queensland and New South Wales.

Dalodesmidae have not been reported from New Guinea, but apparently form an important part of the New Zealand millipede fauna.

Literature

Attems, 1940; Carl, 1902; Chamberlin, 1920b; Johns, 1964; Silvestri, 1910; Verhoeff, 1924, 1936.

Distribution in Queensland

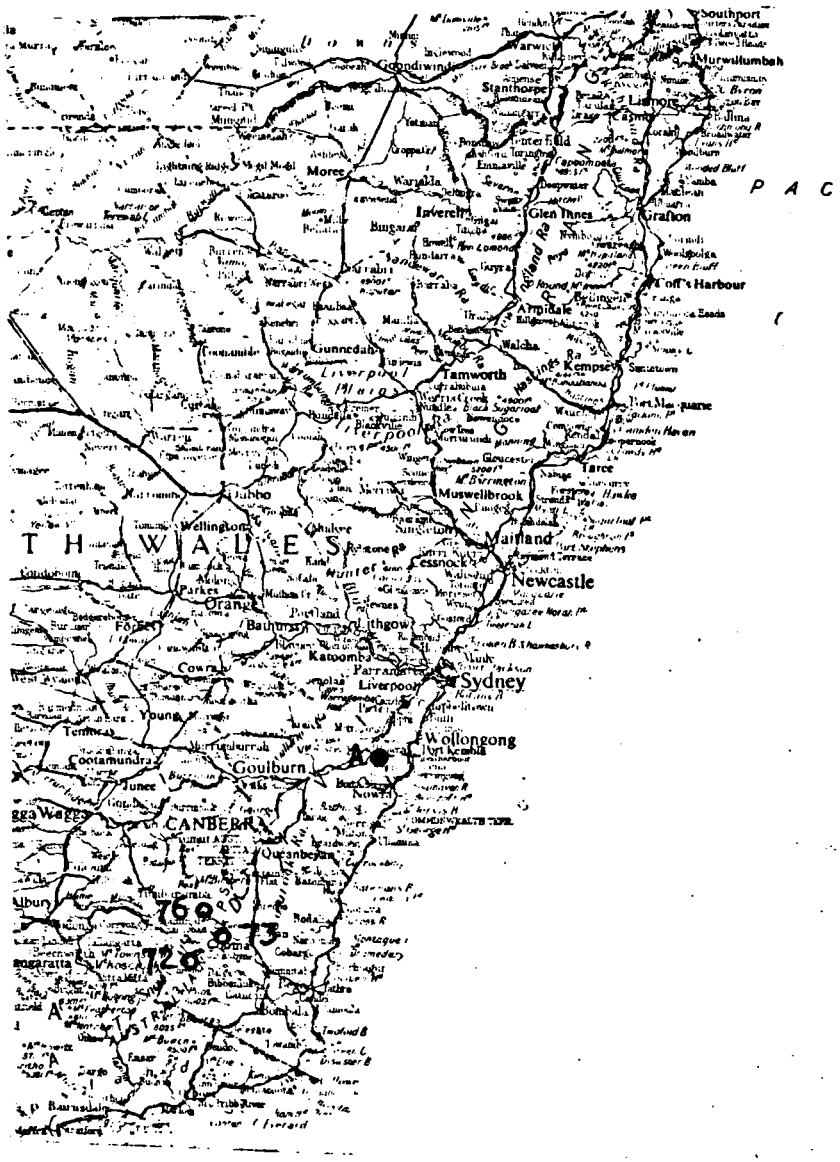
●: localities of described species

A: Kuranda - *Paurodesmus acutangulus* Chamberlin, 1920 (T)

') B: Cedar Creek - *Queenslandesmus sjoestedti* Verhoeff, 1924 (T)

o: localities of collected specimens

Sta. Nr. 13, 17, 29, 45.



') *geographical position to be established, see p. 22.*

Distribution in New South Wales

●: locality of described species

A: Avoca - *Agathodesmus steeli* Silvestri, 1910 (T)

o: localities of collected specimens

Sta. Nr. 72, 73, 76.

Distribution in Victoria

●: locality of described species

A: Melbourne - *Australopeltis martini* (Carl, 1902) (T)

o: localities of collected specimens

Sta. Nr. 84, 88, 91, 92, 93.

Distribution in Tasmania

●: localities of described species

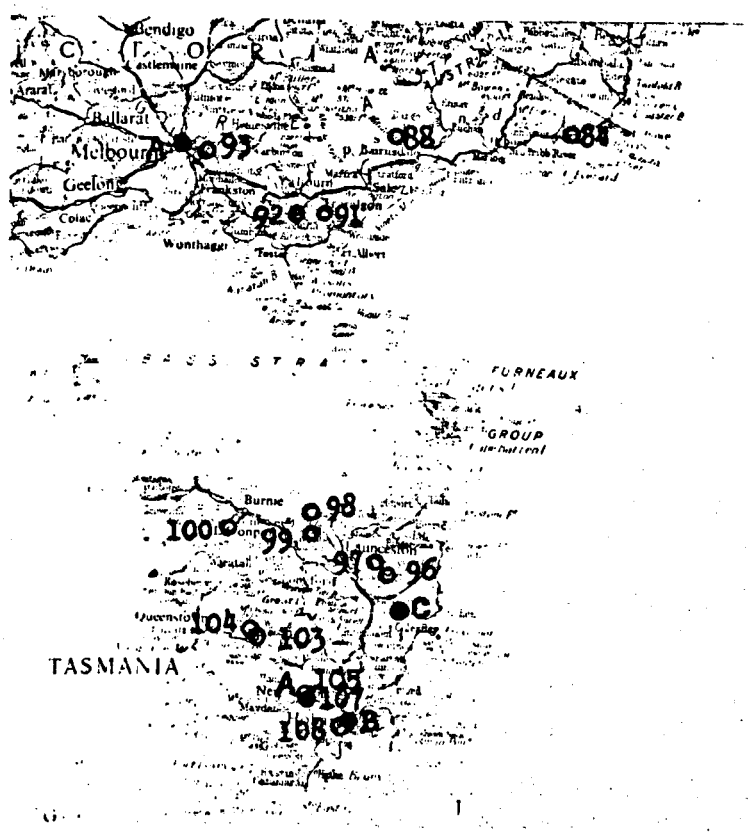
A: Russell Falls - *Lissodesmus modestus* Chamberlin, 1920 (T)

B: Hobart - *Asphalidesmus leae* Silvestri, 1910 (T)

C: Lake Leake - *Tasmaniosoma armatum* Verhoeff, 1936 (T)

No locality - *Tasmanodesmus hardyi* Chamberlin, 1920 (T)

Atopodesmus parvus Chamberlin, 1920 (T)



o: localities of collected specimens

Sta. Nr. 96, 97, 98, 99, 100, 103, 104, 105, 107, 108

V. Acknowledgements

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Valuable advice and technical help was received from Dr. Valerie Davies, Queensland Museum, Fortitude Valley (Qld.), Dr. M.R. Gray, The Australian Museum, Sydney (N.S.W.), Mr. A.A. Calder, National Museum of Victoria, Abbotsford (Vic.), and Miss Alison Green, Tasmanian Museum, Hobart (Tas.).

Collecting permits were received from the Director of Planning, Department of Forestry, Brisbane (Qld.), the Forestry Commission of New South Wales, Beecroft (N.S.W.), the Director of the National Parks and Wildlife Service, Sydney (N.S.W.), the Fisheries and Wildlife Division, Ministry of Conservation, East Melbourne (Vic.), the Director of the National Parks Service, East Melbourne (Vic.), the City Engineer, Hobart (Tas.), and the Director of the National Parks and Wildlife Service, Sandy Bay (Tas.).

VI. Bibliography

In the following list the publications containing descriptions or records of eastern Australian and Tasmanian diplopods are brought together with a number of general monographs or classificatory papers having a bearing on the Australian fauna.

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Dr. C.A.W. Jeekel
Instituut voor Taxonomische Zoölogie (Zoölogisch Museum)
Plantage Middenlaan 53,
1018 DC Amsterdam
The Netherlands