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Pachyrhynchine Weevils (Coleoptera:Curculionidae) of the Islands Fringing Taiwan

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摘 要

Christopher K. Starr, 王效岳 台灣離島之球背象鼻蟲類研究（鞘翅目：象鼻蟲科）台灣省立博物館半年刊 45(2): 5 ～ 14

分佈於台灣、蘭嶼和綠島的 8 種球背象鼻蟲分屬 *Metapocyrtus* 和 *Pachyrhynchus* 兩屬，其中分佈於蘭嶼的一種和分佈於綠島的兩種是第一次被記述，並研討一些寄主植物和擬球背天牛 *Doliops similis* 的觀察結果，同時以實際數據明敘各種球背象鼻蟲在該兩島族群數量之普遍程度和比例關係。

關鍵詞：球背象鼻蟲類，銹點象鼻蟲屬，球背象鼻蟲屬，台灣地區

Abstract

The species of pachyrhynchine weevils on Orchid and Green Islands and the Yaeyama group of the Ryukyu Islands are reviewed, comprising eight species in the genera *Metapocyrtus* and *Pachyrhynchus*. One species is recorded from Orchid Island and two from Green Island for the first time. We present observations on host plants of the common species of Orchid and Green Islands, as well as some notes on the putative mimetic longhorn beetle *Doliops similis*. Evidence is given of shifts in the relative abundance of *Pachyrhynchus* species on Orchid and Green Islands during recent decades. Putative records and specimens of pachyrhynchines from Taiwan island are reviewed; it is concluded that all are unreliable and that the group is absent from Taiwan itself.

Key words: Pachyrhynchine weevil, *Metapocyrtus*, *Pachyrhynchus*, Taiwan area.

"The Pachyrrhynchids have attracted the attention of systematic entomologists for many years on account of their peculiar and unique structure, their limited distribution, their rather striking coloration, and their mimetic relation to species of related geners, to each other, and to certain genera and species of entirely different species." Schultze (1928:257-258)

Introduction

The above quotation summarizes the interest which has long attached to the pachyrhynchine weevils, a natural group of some 400+ known species. These insects are readily recognizable in life and in collections. They are robust, relatively large, and extremely hard-bodied, with long legs and a very short, broad snout, and a species-characteristic pattern of iridescent scales. All are flightless, with fused elytra.

Because of their often bright, contrasting

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markings, pachyrhynchines tend to be conspicuous. In addition, we have usually found them in the open on vegetation at a medium height. These two factors make them among the most individually apparent of non-flying insects.

Dalla-Torre et al. (1931) recorded 374 species of pachyrhynchines in 11 genera. New species have since been described, chiefly in the Papuan genus *Pantorhytes* (Gressitt 1966, Stibick 1976, 1978), but neither the catalogue of Dalla-Torre et al. nor Schultze's (1923-1925, 1928) revision of the Malesian genera has yet been superceded.

It is the geographic distribution of the group which makes it of broad interest in systematics. It ranges from the Ryukyus to Australia, but has its center of diversity in the Philippines. As summarized by Schultze (1928: Table 28) , a majority of the genera and nearly 90% of the species are endemic to the Philippines. In Schultze's table, New Guinea is the only land area outside of the Philippines with more than 1% of the total species. The Pachyrhynchini thus appear to be the only sizable group of organisms with a Philippines-centred distribution. In addition, their usually resrticted species distributions make pachyrhynchines a prime candidate for biogeographic analysis.

Schultze (1923-1925, 1928) knew of only one species north of the Luzon group of islands, *Pachyrhynchus infernalis* on Ishigaki Island (Fig. 1). Since that time several others have been described or recorded from other islands in the area, most notably by Kano (1929a, b) and Kôno (1930). The most recent discussion in the primary literature was by Kano (1931b), although Sakaguti (1981) figured a majority of the species and gave distributional notes. In the present paper we review the subject and add ecological observations on some species.

Pachyrhynchines are found on five islands in the area (Fig. 1), all to the east of Taiwan and oceanic in origin. Green Island (22° 40N 121° 29E) is hilly, with a land area of about 17 km² and a maximum elevation of 281 m. Orchid Island (22° 03N 121° 33E) has a land area of about 47 km² and is much more rugged, with a maximum elevation of 548 m and only a narrow perimeter of coastal lowland. For a broad discussion of the biota of Orchid Island, see Kano (1931b) and others in the Bulletin of the Biogeographic Society of Japan vol. 2-3. Synonyms for Green Island are Lutao (綠島), Kashôtô (or Kwashôtô; 火燒島) and Samasana. Synonyms for Orchid Island are Lanyu (蘭嶼), Botel Tobago and Kôtôsho (紅頭嶼). The other three islands are in the Yaeyama group at the southwestern end of the Ryukyu arc. Iriomote Island (西表島) (24° 20N 123° 50E), With an area of 288 km² and a maximum elevation of 470 m, is largely covered with original forest and has the best preserved natural habitat in the Ryukyus (Sk. Yamane, pers.comm.). Ishigaki Island (石垣島) (24° 24N 124° 12E) has an area of 223 km² and a maximum elevation of 526 m; however, it is on the whole not as mountainous as Iriomote and biotically less well preserved (Sk. Yamane, pers. comm.). Yonaguni Island (與那國島) (24° 25N 123° 06E) is much smaller and lower than either of these.

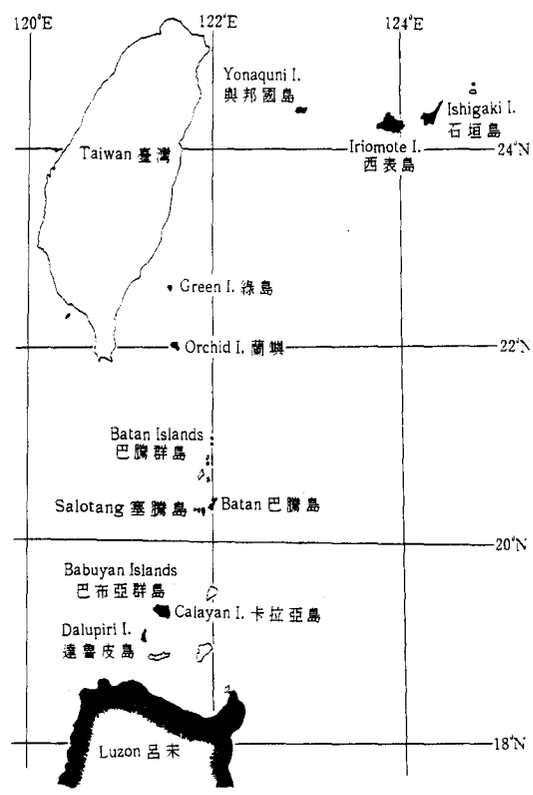

Fig . 1. Taiwan and nearby islands. Shaded areas are those from which pachyrhynchines are known.

Materials and methods

The authors have about 12 and 80 days, respectively, of field experience on Orchid and Green Islands. In addition to material from our own collecting, we have examined that in the Taiwan Agricultural Research Institute (TARI) at Wufeng and in the National Taiwan University (NTU) at Taipei. Numbers of specimens examined are given in Table 1.

Results and discussion

Our review of species largely confirms the results of previous authors, who recorded six pachyrhynchine species from Orchid Island, two of these six from Green Island, and two others from the Ryukyus. We here extend the ranges of two species to include Green Island.

Our review of material in the TARI collection has turned up members of four species ostensibly collected on Orchid Island ("Kotosho") by T. Shiraki but almost certainly not from there. There of the species bear Shiraki labels identifying them as *Apocyrtus inflatus* Erichson (one specimen), *Metapocyrtus chrevrolati* Waterhouse (two specimens) and *Pachyrhynchus jugifer* Waterhouse (one specimen), determinations which we confirm. It is not out of the question that *M. chevrolati* might occur on Orchid Island, as it is known from northern Luzon, but the other two species are known only from restricted areas in the central Philippines. All but one specimen have curious extra pin holes in their labels, suggestive of some kind of tampering, as does the Sphenomorpha specimen mentioned below. We identify the fourth species, represented by one male, as *Metapocyrtus* (*Artapocyrtus*) nr. *longipenis* Schultze. We see no direct indication of tampering with this specimen, but it is a member of a group of closely related species known only from the central Philippines.

The prominence of pachyrhynchines on Orchid and Green Islands is striking. One of us (CKS) has spent nearly six years in various parts of the Philippines and yet has rarely seen pachyrhynchines similarly abundant or speciose at any Philippine locality. The following are remarks on each of the species.

1. *Metapocyrtus immeritus* Boheman(Fig.2)

This is much smaller than any *Pachyrhynchus* in the Taiwam area. In all major characters it matches Schultze's (1923-1925) description of *M. immeritus* in the Babuyan Islands, although with some small, consistent colour differences. Kano (1931b) earlier recorded it from Orchid Island, where it is common today. We saw it on several plants, most commonly on the shrub *Pipturus arborescens* (Urticaceae), together with *Pachyrhynchus tobafolius*. We did not find the species on Green Island. However, we tentatively extend its range to green Island on the basis of a single male at TARI with the locality information "Kashoto, 5.IV.1924, Col. J. Sonan" and three specimens in the Taiwan Museum. Structurally, we find no difference between the TARI specimen and the many examined from Orchid Island, although there are significant colour differences. However, in the TARI specimen the cuticle of the body is uniformly medium reddish (versus dark brown in some parts), and the scales are mostly pink (versus blue-green to violet). The Taiwan Museum specimens resemble those from Orchid Island in color. However, they bear informal, temporary locality labels and are together with similarly labeled specimens from Orchid Island. We have not been able to speak with the collector to confirm the locality information.

2. *Metapocyrtus yonagunianus* Chûjo (Sakaguti 1981: Plate 22 Fig. 11)

Sakaguti (1981) records this species as endemic to Yonaguni Island in the Yaeyama group (fig. 1). We have seen neither specimens nor the original description and so cannot compare this species with *M. immeritus*. To judge by Sakaguti's figure, the two are superficially alike.

3. *Pachyrhynchus infernalis* Fairmaire (Fig. 3)

This species is commonly reported as endemic to Ishigaki Island in the Ryukyus, but some

popular books record it also from nearby Iriomote Island, a result which we confirm.

4. *Pachyrhynchus insularis* Kano (Fig.4)

This species is evidently rare on Orchid Islend, so that we cannot conclude that it is not also found on Green Island.

5. *Pachyrhynchus sarcitis* Behrens (Fig.5)

This is the largest pachyrhynchine in the Taiwan area and, along with *P. tobafolius*, the most conspicuously marked. It was originally described from the Babuyan Islands (Schultze (1923-1925). Kôno (1930) described the Orchid Island form as a new subspecies, *P. sarcitis kotoensis*. It is recorded here from Green Island for the first time.

In our field experience this species is clearly associated with the herbaceous climbing vine *Clematis gouriana* (Ranunculaceae). All but two of our 40 specimens when first seen were either on this plant or on another with which it was tangled. *P. sarcitis* may therefore be unlike most congeneric species in normally occurring on a non-woody plant. However, there is a puzzling distributional anomaly about our specimens. All 38 *Clematis*-associated individuals were from a restricted area covering just a fraction of a hectare within one farm. We examined a great many other *C. gouriana* plants elsewhere on Orchid Island without finding additional *P. sarcitis*. The relationship between the weevil and the plant is thus very uncertain.

6. *Pachyrhynchus sonani* Kôno (Fig.6)

Previous authors have not recorded this species from Green Island, but in our experience it is more abundant there than any other pachyrchynchine. We have found it on a number of plant species, but the majority of individuals were on *Melastoma* prob. *affine* (Melastomataceae), which is common and often reaches a large size among Australian pine (*Casuarina equisetifolia*) plantings. In contrast, we found only a very few small *Melastoma* plants on Orchid Island, where *P. sonani* seems much less common.

7. *Pachyrhynchus tobafolius* Kano (Fig.7)

We have found this species on several plants. but in significant numbers only on the shrubs *Pipturus arborescens* (Urticaceae) and *Acalypha caturus* (Euphorbiaceae). In contrast to its great abundance on Orchid Island (Tables 1-2), we found fewer than half as many *P. tobafolius* as *P. sonani* on Green Island. All of our Green Island specimens were from the few *Pipturus arborescens* plants we found. *A. caturus* seemed similarly uncommon on Green Island.

Kano (1929b) reported *Barringtonia asiatica* (Lecythidaceae) as the host plant of *P. tobafolius*. However, although *B. asiatica* is abundant on both Green and Orchid Islands, we only rarely found *P. tobafolius* or any other pachy rhynchine on it. On several occasions native people pointed out *Pipturus arborescens* as the host of *P. tobafolius*, and it may be that *Barringtonia* was indicated to Kano in a similar way. Why would someone thus lead him astray? To the aboriginal Yami people of Orchid Island, *B. asiatica* and especially its fruit has obscene connotations (Benedek 1991), and we suspect that someone was having a joke with Kano.

About half of the *P. tobafolius* that we have observed were in pairs. Of an estimated 200+ pairs seen, none was out of the usual tieredparallel position, and only three had a third individual on top.

8. *Pachyrhynchus yamianus* Kano (Fig.8)

Our results corroborate the earlier reported range of this species. The few specimens we have seen in the field were not consistently associated with any particular plant.

Kano (1929b) regarded both *P. tobafolius* and *P. yamianus* as common within their range. However, on Orchid Island we found the former much more abundant than any other *Pachyrhynchus*, making up the great majority of *Pachyrhynchus* individuals seen. Given the conspicuousness of pachyrhynchines and our experience in a variety of habitats on the study islands, we hypothesize that the apparent abundance of *P. tobafolius* is real. This would suggest a shift in the relative prevalence of some species since Kano's visits. Table 2 shows the numbers of specimens of the three most

Table 1. Specimens examined for this study.

Species	Orchid Island	Green Island	Ishigaki Island	Iriomote Island	Tatal
Metapocyrtus					
immeritus	384	4			388
Pachyrhynchus					
infernalis			34	19	53
insularis	6				6
sarcitis	161	4			165
nonani	67	86			153
tobafolius	810	36			846
yamianus	111	1			112
Total	1539	131	34	19	1723

commonly collected *Pachyrhynchus* species from collecting efforts known to us. These divide into two convenient periods, 1912-1938 and 1981-1991. The greater abundance of *P. tobafolius* relative to *P. yamianus* in the later period is statistically significant (Chi-square test, $p < 0.001$).

To test whether the observed difference might be due to a seasonal difference,in which early collectors tended to visit the island during one season and later ones during another season,we sought to divide the year into two climatically distinct times. Rainfall is relatively even throughout the year on Orchid Island, with two indistinct modes and with the wettest month (September) having on average only a little more than twice as much rain as the driest (April) (Lin 1990). On the other hand, the annual temperature profile shows a simple, clear pattern during the coolest half of the year (November-April) the mean monthly temperatures are between 18-24 ℃ , while during the warmest half (May-October)they are between 24-28 ℃ (Lin 1990). The relative abundance of *P. tobafolius* and *P. yamianus* during the cool and warm seasons is not significant (Chi-square test, $p > 0.5$).

The data as they stand are thus consistent with the hypothesis that *P. tobafolius* has in recent years increased in abundance relative to *P. yamianus*. At the same time, let us note a key assumption of our treatment, i.e. that earlier collectors took all *Pachyrhynchus* that came their way or at least did not strongly bias their attention toward less common species.

The data appear to favour a similar interpretation for the abundance of *P. tobafolius* relative to *P. sarcitis*. Because of the anomalous distribution of *P. sarcitis* in our collections, as noted above, an exact statistical test seems unwise. Specifically, we suspect that our July 1991 collection of this species is inflated through some unknown cause. If we were to deflate by as much as 39 the 1981-1991 figure of 45 specimens

Table 2. Numbers of specimens of the three most abundant *Pachyrhynchus* species from major collecting efforts on Orchid Island. All material not collected by the authors is in the TARI collection.

Collector, date	*tobafolius*	*yamianus*	*sarcitis*	Total
T. Shiraki, VII. 1912	4	2	8	14
T. Okuni, III-IV. 1920	7	23	26	56
R. Takahashi, VI. 1926	14	3	2	19
S. Hirayama, XII. 1931-II. 1932	7	5	10	22
S. Hirayanma, III-IV. 1932	50	29	18	97
M. Chujo, VI-VII. 1938	11	33	31	75
(anonymous), VII. 1938	8	4	2	14
K.S. Lin et al., IV. 1981	23	1	4	28
H.Y. Wang, II. 1987	14	0	0	14
autjprs. III. 1991	287	2	1	290
authors & S. S. Lu, VII. 1991	378	5	40	423
Total	803	107	142	1052
Subtotals				
1912-1938	101	99	97	297
1981-1991	702	8	45	755
November-April	388	60	59	507
May-October	415	47	83	545

and the May-October figure of 86 specimens, they would be nearly identical to those for *P. yamianus*.

Our observation of *P. sonani* as the commonest species on Green Island, in contrast to its lack of mention from there by earlier authors, is a further suggestion of shifts in relative species abundance.

That such changes should have taken place on Green Island is not hard to see, as the island is virtually covered in second-growth at an early stage of succession (pers. obs.). However, Orchid Island appears to have been ecologically stable for a very long time. The land above the narrow coastal band is nearly entirely covered with primary or well-developed secondary forest, and during this century there has been no significant clearing of land for agriculture (Benedek 1991). If vegetational changes are responsible for the recent abundance of *P. tobafolius*, they have evidently been rather subtle.

One possible factor in pachyrhynchine faunal differences between these two islands is the great abundance on Green Island of a stout, hard-bodied, flightless otiorhynchine weevil, *Kashotonus multipunctatus* Kôno (Fig.9). We hypothesize a competitive-exclusion relationship between this weevil and some pachyrhynchines. *K. multipunctatus* is found on several different plants, most commonly *Barringtonia asiatica*, *Melastoma* prob. *affine* and an unidentified fig tree. It is recorded only from Green Island (Marshall 1956), and we have certainly not seen it on Orchid Island.

Marshall (1916) and Schultze (1923-1925) commented on the striking resemblance between beetles of the genus *Doliops* (Cerambycidae)and certain *Pachyrhynchus* species. Both were uncertain about the function of this apparent mimicry, but suggested that the extreme anti-predator hardness of *Pachyrhynchus* might at least partly account for it. Sakaguti (1981) further commented on this relationship and figured *D. similis* Miwa & Mitono. This Orchid Island endemic is quite rare, in our experience, consistent with its putative role as a batesian mimic. Among its special features are iridescent blue-green stripes on a shiny black ground colour, an unusually (for its family) stout body, and antennae which do not even reach the tip of the abdomen (Fig. 10). In colour pattern it is most like *P. yamianus* among Orchid Island pachyrhynchines and to a lesser extent like *P. sonani*. The beetle's resemblance to these species rather than *P. tobafolius* is consistent with the idea that the latter's prevalence on Orchid Island is a recent phenomenon.

Are there pachyrchynchines on Taiwan island itself? We have found no convincing evidence of any and conclude that there are none. Kôno (1930) recorded and figured a sigle specimen of *P. orbifer* Waterhouse with locality information "Formosa (Ako, 1 ♀ , 10/vii.1907, Dr. S. Matsumura)." The figured specimen closely resembles *P. orbifer* from Ilocos Norte, Luzon figured by Schultze (1923-1925). Althouth Kôno clearly implied that Ako is on Taiwan island, it is not apparent that tihs is part of the label information, and the locality is unknown to us. On the basis of Kôno's report, Kano (1931b: Table 1, Plate 18) recorded *P. orbifer* from Taiwan island without further comment, a very curious treatment of what should have struck him as noteworthy. There are indications that Kano, with extensive field experience in Taiwan, had reservations about it.

We have seen two specimens of *P. yamianus* ostensibly collected in the Taichung area.One is in NTU, with the locality given as "Liying Taichung", apparently included in a student's class assignment. The locality is unknown to us, and the curator of the collection considers it spurious (T. C. Hsu, pers. comm.). The other specimen is in TARI, wiht locality information given as "Rimogan", 16 August 1941, by an unknown collector. Chiu (1948) characterized Rimogan simply as an aborginal name for an unknown locality near Taichung. Neither record seems at all reliable. TARI also has a specimen ostensibly collected at Hengchun ("Koshun") by T. Shiraki and bearing a Shiraki label identifying it as *Sphenomorpha nitidula* Pascoe. We have confirmed that the specimen belongs in this genus, which is known only from New Guinea and the Moluccas.

Both labels have extra pin holes, as mentioned above regarding certain specimens ostensibly collected on Orchid Island. The state of this specimen strengthens our suspicions of tampering with the others mentioned above.

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Footnotes

1. Most authors have used a double r in "