Notes on the Elaterid Genus Eopenthes, Sharp (Coleoptera)\(^1\)

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(Presented at the meeting of September 8, 1958)

The endemic Hawaiian genus *Eopenthes* (subfamily Ampedinae of the coleopterous family Elateridae) is distinguished from the rest of that subfamily by having the sides of the mesosternal cavity perpendicular, or nearly so. The genus was erected by Sharp (2)\(^2\) to include six species described in 1885 (2), three by Blackburn and three by himself, and further included *Elater humeralis* described earlier by Karsch (1). In 1908 Sharp (6) described 26 more species. It is the present writer's opinion that of the species recognized by Sharp, no more than 31 are valid. The types of all the *Eopenthes* except one, are in the British Museum of Natural History; *E. humeralis* (Karsch), I am informed by Dr. J. W. Machatschke, is in the Zoological Museum in Berlin. The type of the genus is *Eopenthes basalis* Sharp designated as such by Hyslop in 1921 (3).

*Eopenthes* are found in the native mountain forests where the adults are usually swept from vegetation. Their larvae feed in decaying wood (4), and are presumably predaceous on other insects.

Perkins (4: cxxx) wrote: "*Eopenthes* is an endemic genus with 33 described species, many of which are rare and imperfectly known, the species being extremely hard to distinguish. Some have a constant colour pattern, while others are very variable. In the latter case individuals of one species may be of two or three quite different patterns of colour, these same colours being of specific value in other species and not varying. These beetles are remarkable amongst the Hawaiian Coleoptera for several reasons. They are almost entirely summer insects or at least do not occur between November and March. They are almost the only native beetles found visiting flowers for the sake of the nectar, being especially fond of the blossoms of *Metrosideros*. They are also largely of diurnal habits. Unfortunately many of them appear to be rare or this may be

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\(^{1}\)This paper was prepared under Grant 2898 of the National Science Foundation. The writer is also indebted to the following persons in the British Museum of Natural History: Dr. W. E. China, Mr. E. B. Britton, and particularly to Miss C. M. F. von Hayek. In addition, Mr. J. W. Beardsley of the Experiment Station, Hawaiian Sugar Planters' Association, and Miss Amy Suehiro of the Bishop Museum were helpful.

\(^{2}\)Numbers in parentheses refer to the bibliography at the end of this article.
partly due to their comparatively short season . . .” Identification of *Eopenthes* in Hawaii has been handicapped by the extreme rarity in local collections of all but a few species (nine of the 33 named forms were described from uniques), and by their confusing variability in coloration. Many of the original descriptions were brief, and often are more comparative than descriptive.

Little specific help is found in the characters of the male aedeagus, although differences in the relative length and breadth of that organ are discernible in some species. The aedeagus is of the tripartite type universal among the Elateroidea (fig. 1, A). In *Eopenthes* it is characterized as follows: (1) the median lobe is longer than the lateral lobes, and is narrowed toward the apex to form a more or less acute tip; (2) the lateral lobes have a “shoulder” at about the middle of their outer margin; above the shoulder they are roughly parallel-sided, with the outer margin rounded at the apex, and the inner ending in a definite angle. The greatest departure from this pattern is found in the aedeagus of *Eopenthes muticus* Sharp (fig. 1, B) in which the outer margin of the lateral lobes is strongly arcuate above the shoulder, and the lobes themselves more strongly produced at the tip.

Sharp (6: 370) published a key to separate the species into four presumably related groups and one individual species, to which he referred by numbers. The present paper gives keys to Sharp’s species groups. In treating his largest group (species 6–28) the species have been segregated by island before attempting further separation on morphological differences or on color. So far as is known, all but one of the species of *Eopenthes* are restricted to a single island; the exception is *E. caeruleus* Sharp, taken on both Molokai and Lanai. Of the species recognized by Sharp, six are known from Kauai, 13 from Oahu, six from Molokai, and three each from Lanai, Maui and Hawaii. Sharp’s key:

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a  Color metallic .................................................. Species 1 and 2
a' Color not metallic
   b  Prosternal process not bent upward behind the front coxae .................................................. Species 3–5
   b' Prosternal process bent upward behind the front coxae
      c  Tarsi notably thickened; fourth joint of hind feet not minute
      d  Prosternal process before the apex projecting as a sharp denticle .................................. Species 6–28
      d' Prosternal process before the apex not denticular ......................................................... Species 29
      c' Tarsi thickened, fourth joint of feet minute ................................................................. Species 30–33
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(Line c’ could more properly read: “Tarsi thickened, but not notably so”, etc.)
Sharp’s numbers refer to the following:

1 caeruleus Sharp (6: 370) Lanai; Molokai
2 auratus Sharp (6: 371) Molokai
3 basalis Sharp (2: 153) Oahu
4 longicollis Sharp (6: 371) Kauai
5 humeralis (Karsch) (1: 5) Maui
6 obscurus, Sharp (2:154) Oahu
7 kauaiensis Sharp (6: 373) Kauai
8 germanus Sharp (6: 373) Oahu
6 obscurus Sharp (2:154) Oahu
10 politus Sharp (6: 373) Maui
11 deceptor Sharp (6: 374) Molokai
12 perkinsi Sharp (6: 374) Oahu
13 divisus Sharp (6: 374) Oahu
14 konae Blackburn (2: 154) Hawaii
15 cognatus Sharp (6: 375) Hawaii
16 celatus Sharp (6: 376) Molokai
17 gracilis Sharp (6: 376) Molokai
18 mauiensis Sharp (6: 376) Maui
19 unicolor Sharp (6: 377) Kauai
20 funebris Sharp (6: 377) Kauai
21 plebeius Sharp (6: 377) Lanai
22 arduus Sharp (6: 378) Oahu
23 antennatus Sharp (6: 378) Oahu
24 oahuensis Sharp (6: 378) Oahu
25 varians Sharp (6: 379) Molokai
26 satelles Blackburn (2: 155) Lanai
27 tinctus Sharp (6: 379) Hawaii
28 ambigus Blackburn (2: 155) Oahu
29 muticus Sharp (6: 380) Kauai
30 debilis Sharp (2: 154) Oahu
31 parvulus Sharp (6: 381) Oahu
32 marginatus Sharp (6: 381) Oahu
33 tarsalis Sharp (6: 381) Kauai

Figure 1. A, Aedeagus of Eopenthes mauiensis Sharp, type (British Museum), Haleakala, Maui, 5000 ft., Perkins, May 1896; typical form of nearly all species of Eopenthes.

B, Aedeagus of Eopenthes muticus Sharp, type (British Museum), High plateau, Kauai, Perkins, August 1896; the most aberrant form of aedeagus in the genus.

(Both figures are greatly enlarged in approximately the same degree)
SPECIES 1–2

cæruleus, auratus

The color differences implied by their names are sufficient to separate these species. E. auratus was described from a unique male taken at 4000 ft. on Molokai. E. cæruleus is the only member of the genus known from more than a single island; it occurs on Molokai as well as on Lanai.

SPECIES 3–5

basalis, longicollis, humeralis

1. Antennae black except for segments 1 and 2 (and sometimes 3) which are rufous; elytra strongly spinose (Oahu) (3) basalis
   Antennae wholly black................................................................. 2

2. Dorsum uniformly black, or with base of elytra briefly rufous; elytra strongly spinose (Kauai) (4) longicollis
   Dorsum blackish, with basal one-fourth to one-third of elytra rufous; elytra finely mucronate (Maui) (5) humeralis

E. basalis is found on Tantalus and in other parts of the Koolau Range on Oahu; longicollis at from 2000–3000 ft. on Kauai; and humeralis at 3000 ft. on Haleakala, Maui.

SPECIES 6–28

KAUAI SPECIES

kauaiensis, unicolor, funebris

1. Apex of elytra neither spinose nor mucronate; antennae and legs blackish; segment 4 of anterior tarsus nearly as long as 3 (19) unicolor
   Apex of elytra spinose; segment 4 of anterior tarsus distinctly shorter than 3................................................................. 2

2. Legs more or less uniformly blackish (20) funebris
   Legs rufous with tarsi dusky....................................................... (7) kauaiensis

Only females of kauaiensis are known, while funebris and unicolor are known only from males. All three occur at from 3000 to 4000 ft. on the high plateau above Waimea. Each is represented in the British Museum by two specimens.

The second specimen of kauaiensis is labeled “var.” (probably by Sharp), and differs from the type female as follows:
kauaiensis type female
1. Hind angles of prothorax moderately acute.
2. Scutellum rather robust; widest across middle, thence narrowed to apex.

kauaiensis "var." female
1. Hind angles extremely acute and fine.
2. Scutellum more slender; narrowed from anterior margin to apex.

The variety of kauaiensis agrees better with funebris than with the type of kauaiensis. It may be the female of funebris despite color differences in the legs.

OAHU SPECIES
obscurus, perkinsi, antennatus, germanus, divisus, oahuensis, pallipes, arduus, ambiguus

1. Pronotum and elytra (except suture) mahogany colored; head and elytral suture black .................................................. (12) perkinsi
   Not so colored ........................................................................................................... 2

2. Elytra yellowish on basal one-half or more, black an apex, the division between the colors well-defined..................... (13) divisus
   Not so colored ........................................................................................................... 3

3. Dorsum uniformly blackish or dark fuscous except for base of elytra which is flavous.................................................... (24) oahuensis
   Not so colored ........................................................................................................... 4

4. Apex of elytra finely but definitely spinose................................................. 6
   Apex of elytra briefly, weakly spinose................................................................. 5

5. Antennal segment 3 slightly longer than 2; interval 3 of elytra markedly elevated at base; sides of prothorax more arcute than in obscurus.............................................................. (8) germanus
   Antennal segment 3 not longer than 2; interval 3 of elytra only slightly elevated near base; sides of prothorax narrowed forward in straight line from base of hind angles.................................................. (6) obscurus

6. Color generally reddish to ochraceous; head, anterior margin and disc of pronotum, and sometimes sides and suture of elytra, black ......................................................................................... (28) ambiguus
   Color piceous black or brown ................................................................................ 7

7. Uniformly piceous black; pronotum strongly convex behind; hind angles of prothorax definitely divergent from outline of sides ................................................................. (9) pallipes
   Brown or brownish; pronotum moderately convex behind; hind angles of prothorax only weakly divergent at most ............................................................ 8
8. Brown, head and anterior part of pronotum blackish; prothorax more arcuate on sides, less convergent anteriorly, and hind angles more weakly divergent than in antennatus (7.5–8.5 mm.)

Reddish brown, head and disc of pronotum blackish; prothorax more arcuate on sides, less convergent anteriorly, and hind angles more weakly divergent than in antennatus (7.5–8.5 mm.)

E. germanus is known only from the unique female in the British Museum, and comparison with obscurus of the outline of the pronotum is based on females of both species; comparison of prothoracic characters in the case of antennatus and arduus is based on males, inasmuch as only males of the latter are known. Clear separation of antennatus and arduus is difficult. As described, arduus is somewhat smaller and less depressed than antennatus, and has the sides more arcuate and less strongly convergent in front. In addition, the hind prothoracic angles diverge less perceptibly from the outline of the sides in arduus than in antennatus. No definite aedeagal differences serve to separate the two.

Sharp (6:378) compares arduus and ambiguus as follows: “it is considerably larger and broader than E. ambiguus, and the coloration though variable in both appears never to quite agree: the feet are not black in E. arduus, and the thorax is not red with a large black patch on the middle, but is either nearly red or nearly black.” The prothorax of ambiguus in the British Museum appeared to me to be basically yellowish instead of reddish, but the colors may have faded.

E. ambiguus was described from a single specimen taken by sweeping at the head of Palolo Valley, Oahu at 2000 ft.; the type is a male bearing a coded label indicating that it was from the Koolau Range, Oahu.

E. pallipes, known only from the unique female in the British Museum, is distinct from the other species in this group, but Sharp (6: 373) suggested that it so closely resembles E. cognatus from the island of Hawaii that the validity of the Oahu species is doubtful. From antennatus, pallipes can be distinguished (comparison made of females) by the greater length of the prothorax, compared with its width.

Field data on most of these Oahu species are meager. E. divisus was beaten from “ohia” (Metrosideros) blossoms on the ridge between Manoa and Palolo; obscurus and perkinsi were taken at elevations of from 2000 to 3000 ft. in the mountains near Honolulu.

MOLOKAI SPECIES

decaptor, gracilis, celatus, varians
1. Punctuation on disc of pronotum strong, close-set, separated by spaces equal to about the diameter of the punctures... (25) varians
   Punctuation finer, sparser, punctures separated by at least twice their diameter

2. Basal slope of pronotum with sharply incised median groove
   Median groove on basal slope wide or vague, not sharply incised... (11) deceptor

3. Basal slope of pronotum abrupt, widely grooved; femora rufous, rest of legs blackish... (17) gracilis
   Basal slope gently, vaguely grooved at most; coloration of legs uniform... (16) celatus

E. deceptor is known only from the unique female, and celatus from two males in the British Museum. Of celatus, Sharp (6: 376) wrote that "... it appears to be most like E. konae, but the elytra are not spinose at the tip, and the antennae and tarsi are rather more elongate... it agrees in most other respects with E. konae.” E. gracilis also is said to be extremely close to konae. Specimens of varians have been taken at 4000 ft. in the Molokai mountains.

LANAI SPECIES
plebeius, satelles

Insects of moderate size (9-9.75 mm.); pubescence coarse on pronotum; head brown to obscure, not definitely black... (21) plebeius
Smaller species (7-7.75 mm.); pubescence on pronotum moderately coarse; head definitely black... (20) satelles

Only males of plebeius are known. The original description of E. satelles (2: 155) is initialed “D.S.,” but from the context was obviously written by Blackburn; later (6: 379) it was credited to Blackburn by Sharp. The probable type of satelles is a female (7 mm. long) in the British Museum, collected at Koele, Lanai in July at 2000 ft. while sweeping ferns.

MAUI SPECIES
mauiensis, politus

Elytra finely spinose at tip; legs yellowish with tarsi entirely, tibiae partially or entirely, blackish... (18) m au i e n s i s
Elytra not spinose at tip; legs uniformly yellowish... (10) politus

E. politus is known only from the unique female in the British Museum. Both sexes of m au i e n s i s are present there, as well as a third specimen labeled by Sharp: “E. m au i e n s i s var. nigripes D.S.,” the legs of which are entirely black. Both politus and m au i e n s i s have been taken on Haleakala at 5000 ft.
HAWAII SPECIES

cognatus, konae, tinctus

1. Hind angles of prothorax prolonged and very acute; interval 3 of elytra not prominent toward base..........................(27) tinctus
   Hind angles only moderately acute; interval 3 of elytra prominent toward base.............................................. 2

2. Pubescence brownish, rather long on pronotum; pronotal punctation somewhat coarser, and body more robust than in cognatus
   Pubescence blackish, not remarkably long; pronotal punctation finer and body more slender than in konae (14) konae

The probable type of E. konae is a male (8 mm. long) labeled Eopenthes konae Blackb., and with a symbol on the mounting card identifying it as from the island of Hawaii. According to Blackburn, he had one specimen, taken in flight at Kona, at an elevation of 5000 ft. There are over 200 specimens under this name in the British Museum, 75 of them labeled as konae or variety. Perkins (5: cxxx) remarked that konae “... a very variable species, is very abundant and widely distributed on Hawaii and is found in all sorts of situations, even under stones.”

Six specimens of E. cognatus are in the British Museum: a type male, a type female; a male and a female “Ind. type D.S.” (typical individuals); and two males labeled “var.” One of these last has uniformly blackish legs. The basal prominence on the third intervals of the elytra, in both konae and cognatus, is more noticeable because of the depressed fourth interval. I not only concur with Sharp’s remark (6: 376) that cognatus is somewhat doubtfully distinct from konae, I consider them conspecific.

E. tinctus is known only from the unique male in the British Museum.

SPECIES 29

E. muticus, described from a male taken at 4000 ft. on the high plateau of Kauai, is the only species in the genus to combine the following characters: non-metallic in color; mucro bent upward behind the fore coxae and not denticulate at its apex; tarsi notably thickened, segment 4 of the hind tarsi not especially small. Only males are known.

This species exhibits the greatest deviation from the typical Eopenthes form of aedeagus. The outer margin of the lateral lobes is strongly arcuate between shoulder and apex; the tip of each is more or less acutely produced (fig. 1, B).
SPECIES 30–33

debilis, marginatus, parvulus, tarsalis

1. Tarsi of fore legs notably thickened (Kauai) (33) tarsalis
   Tarsi thickened but not notably dilated (Oahu) 2

2. Elytral striations strongly marked (30) debilis
   Striations weaker 3

3. Brown insects (only females known) (31) parvulus
   Black and yellowish insects (only males known) (32) marginatus

E. tarsalis is known only from the unique female collected in July at 3000 ft. on Kauai. The type of debilis is a female, taken sweeping ferns on Oahu at 2500 ft. in the Waianae Mountains.

Among museum material I have seen in Hawaii and elsewhere, parvulus specimens are invariably females, and marginatus always males. Field populations occurring together on Scaevola blossoms in the Oahu mountains likewise consist of female parvulus and male marginatus (7). Sharp's suggestion (6: 381) that the two constitute a single sexually dimorphic species is undoubtedly true, and the name parvulus has positional page priority over marginatus.

References Cited