

THE AFRICAN SPECIES OF BAEOANUSIA, AN ENCYRTID GENUS OF HYPERPARASITES (HYMENOPTERA)¹

BY
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Baeoanusia Girault

Baeoanusia Girault A. A., Mem. Queensland Mus., 4:163. 1915.

The assignment of the species treated in this paper to the genus *Baeoanusia* is based on the supposition that the species *B. africana* Girault was placed in its proper genus by its author.² The genus *Baeoanusia* was erected by Girault, in 1915, for the reception of three Australian species. Subsequently he described two other Australian species under *Baeoanusia*. In 1916, Girault described *Baeoanusia africana* from six specimens reared from *Saissetia oleae* (Bernard), collected in Cape Colony, Union of South Africa, by C. P. Lounsbury.

Among the coccid-inhabiting encyrtids collected by E. W. Rust, in South Africa, is a series of specimens that were determined by P. H. Timberlake as *Baeoanusia africana* Girault. These were reared from *Saissetia oleae* collected in Cape Colony. As the specimens agree with Girault's description and are from the type locality and issued from the same coccid it is safe to conclude that the specific determination is correct.

In 1914, Dr. F. Silvestri described *Bothriothorax oleae* and *B. minor* from specimens reared from *Saissetia oleae*, collected at Nefasit,

¹ Paper No. 237, University of California, Graduate School of Tropical Agriculture and Citrus Experiment Station, Riverside, California.

² In the following pages this species is shown to be a synonym of *B. minor* (Silvestri).

Eritrea. From Silvestri's description and figures it was evident that the species were not *Bothriothorax* but were possibly *Baeoanusia*. In reply to a request, Dr. Silvestri kindly sent a cotype of his species *Bothriothorax oleae*. It proved to be congeneric with the species identified as *Baeoanusia africana* Girault.

In December of 1929, the Citrus Experiment Station of the University of California sent me to Eritrea, to investigate black scale conditions and to import the primary parasites of the scale into this state. Prior to this investigation it was supposed that the species of *Baeoanusia* were probably primary parasites, and possibly were responsible for the rarity of the black scale at Nefasit, as recorded by Silvestri.³

In a large series of specimens collected from various localities in Africa only two species of *Baeoanusia* appear. They are the two species originally described by Silvestri under *Bothriothorax*. The two species are quite distinct and may be separated by the following key:

Frontovertex relatively wide, between one-fourth and one-fifth as wide as the head. Ocelli in an equilateral triangle, the anterior ocellus plainly more than its own diameter from the orbits. Apex of middle tibiae and the spur blackish. Knees of all legs more or less brownish. Tarsi of middle and hind legs whitish. Middle tibiae faintly whitish at base. Remainder of the legs blackish. Abdomen, after shrinkage, longer than the thorax, triangular. A large species measuring about 2.7 mm. in length*oleae* (Silvestri)

Frontovertex relatively narrow, about one-eighth as wide as the head. Ocelli in a strongly acute triangle, the anterior ocellus about its own diameter from the orbits. Apex of middle tibiae and the spur yellowish or white. All tibiae broadly marked with yellowish or whitish on the ends. Abdomen, after shrinkage, as long as the thorax, plainly shorter than in the foregoing species. A smaller species measuring about 1.7 mm. in length.....*minor* (Silvestri)

***Baeoanusia oleae* (Silvestri)**

Text figures 1-2

Bothriothorax oleae Silvestri, Boll. Lab. Zool. Portici, 9:290-291, 2 figs. 1914.

Many hundreds of specimens of this hyperparasite were reared from black scale, *Saissetia oleae*, mostly collected on *Croton macrostachys*, growing in the vicinity of the Abyssinian villages of Ez'tacle-san and Giglasciu, located about 50 kilometers north of Asmara on the Plateau, at an elevation of approximately 7800 feet. Occasional specimens were reared from material collected on various hosts in the towns

³ Silvestri, F. Boll. Zool. Lab. Portici, 9:258. 1914.

of Asmara and Cheren. From some of the samples taken at Giglasciu, the *B. oleae* outnumbered all the primary parasites combined but these were extreme cases. In the original record concerning this species Silvestri stated that it was the most numerous of the species reared from the black scale which he collected at Nefasit. A series of fifteen females and eight males were reared by Rust as follows: eleven females and six males from *Saissetia persimile* (Newstead), Durban, Natal, February and March, 1927; two females from *Saissetia nigra* (Niet.) Mayville, Natal, May, 1926, and Durban, April, 1926; one female and two males from *Saissetia oleae* (Bern.) Durban, January, 1927, and April, 1926.

As previously stated, it was assumed that this species was probably a primary parasite so that when the first living specimens were obtained they were carefully tended. After being allowed to mate, the specimens were placed in a large vial and provided with unparasitized black scale.⁴ They failed to oviposit and more than a week elapsed before the combination of circumstances which stimulated oviposition was discovered.

OVIPOSITION

The female makes a rather rapid examination of the scale by tapping it with her antennae. If the scale is not inhabited by a larva or pupa of *Scutellista cyanea* (Motsch.) the parasite goes to the next scale or sometimes it remains to verify her preliminary inspection by probing the scale with her ovipositor. Evidently, the preliminary inspection with the antennae usually enables the parasite to determine whether or not a suitable host is concealed within the scale. When a scale that contains either a larva or pupa of *Scutellista* is discovered, the parasite proceeds to oviposit. The ovipositor is inserted through the derm on the sides at about the height of the anus. Often, whether the result of chance or of design, the insertion is made through the anus. When the parasite oviposits through the anus the insertion is quickly made through the soft tissue. If the derm is drilled, several minutes elapse before the insertion is made. When drilling in tough derm, the parasite continually vibrates while the hole is being bored. After an opening has been made the parasite exerts her ovipositor its full length and rapidly probes in lateral directions, the body working up and down synchronously with the thrusting of the ovipositor.

⁴ These observations on the life history of the species were made at Nefasit, Eritrea, where a temporary laboratory was established.

After observations on the oviposition indicated where to search, the newly laid eggs of the parasites were readily obtained by dissecting the *Scutellista* larvae and pupae. Some of the scales used in the experiments contained larvae or pupae of both *Scutellista cyanea* and *Metaphycus lounsburyi* (Howard). In no case was an egg found in the larvae or pupae of *Metaphycus*.

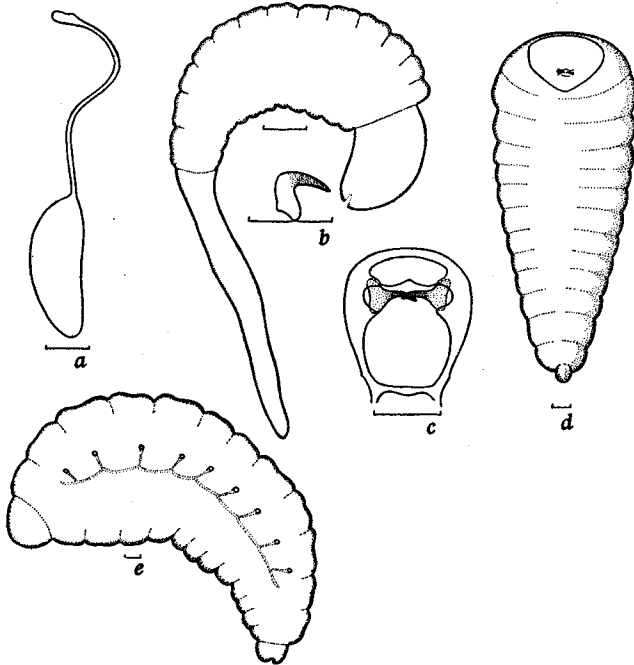


Fig. 1. *Baeoanusia oleae* (Silvestri). *a*, Newly laid egg; *b*, larva at least second stage and its mandible enlarged; *c*, mandibles and endoskeleton; *d*, mature larva ventral view; *e*, mature larva lateral view showing stigmata.

THE EGGS AND THE LARVAE

The newly laid egg of *Baeoanusia oleae* has a long stalk as shown in figure 1*a*. The egg, inclusive of the stalk, measures about 1.0 mm. long. The bulbous portion of the egg is 0.35 mm. long by 0.14 mm. wide. The eggs are clear and transparent. Occasionally the stalks get tangled in the internal organs of the host and the eggs do not float out freely in the water when the host is dissected. The exact length of the egg stage was not determined.

In one experiment a female was allowed to oviposit at midday, April 30, 1930. Dissections made on May 4 showed larvae which had

at least reached the second instar as it was necessary to dissect adhering moult skins away to get a clearer view. One of these larvae, at least second instar, and five days old, is shown in figure 1b. Thirteen body segments, exclusive of the head and tail, were counted. On May 8, dissections of *Scutellista* belonging to the same lot of material were made. The *Baeoanusia* larvae occupied about two-thirds of the body of the *Scutellista*, yet the latter were still alive. Nine pairs of stigmata were visible and the cast larval skins adhered to the body. Mature larvae were present on May 10 in the lot of material oviposited in on April 30. A ventral and a lateral outline drawing of a mature larva is shown in figure 1d, e. In size and shape the *Baeoanusia* larvae are not greatly unlike those of *Scutellista* which they have destroyed. The only remains of the *Scutellista* were the shrivelled skins matted in the débris with hatched scale eggs.

The press of other work prevented a more detailed biological study and the date when the adults issued was not determined.

THE ADULTS

The adults are large, active parasites. All the specimens obtained in Eritrea were of uniformly large size. They appear to be larger than the adult *Scutellista* due to the more compact and stouter structure of the latter.

Silvestri's figure of the adult gives an excellent picture of the general appearance of this species. It is not entirely correct in showing the relative proportions of the frontovertex which varies between one-fourth and one-fifth of the width of the head instead of almost one-third as shown in the figure. Prior to receiving a cotype of the species for study, I supposed the Natal specimens to be undescribed and prepared a description. Since this species is a serious hyperparasite and its further spread is to be guarded against, a description in English is not superfluous.

FEMALE—

Head, dorsal view, menisiform, about twice as wide as long and about four and one-half times as wide as the frontovertex. Frontovertex a trifle more than twice as long as wide (9:4). Ocelli about in an equilateral triangle, the posterior pair almost touching the orbits and almost once their own diameter from the occipital margin. The anterior ocellus about one and one-half times its own diameter from the orbits. Head, frontal view, appreciably wider than high (30:23). Scrobes well developed, rounded above. Antennal sockets with their upper margins about tangent to the basal ocular line, spaced further

apart than they are from the oral margin. Head, lateral view, dorsal line convex, occipital line slightly concave, facial line almost straight. The eyes reach downward about one-half way.

Mandibles as shown in figure 2b.

Antennal scape narrowly flattened and expanded below toward the apex. Pedicel almost twice as long as wide. All funicle joints successively increase in width, the first about as wide as long, the sixth about twice as wide as long. Club about as long as the funicle joints united and almost twice as wide as the sixth, strongly oblique at apex. Other details of the antennae as shown in figure 2a.

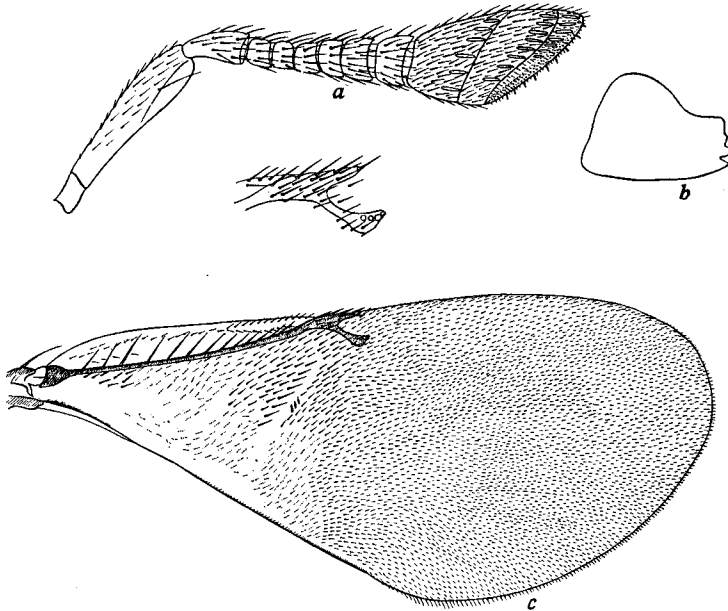


Fig. 2. *Baeoanusia oleae* (Silvestri). Female. a, antenna; b, mandible; c, forewing and detail of venation above.

Fore wings as shown in figure 2c. The cilia at the base hardly visible in balsam mounted specimens. Marginal vein about twice as long as wide. Stigmal vein slightly longer than the postmarginal.

Abdomen elongate, triangular, pointed at the apex, the ovipositor sheaths slightly exerted.

Sides of the propodeum with rather conspicuous white setae.

Head finely reticulate except for the polished scrobes. Frontovortex with setigerous punctures arranged in four parallel rows, two submedian rows and a row paralleling each orbit. Mesoscutum and axillae finely, transversely reticulate. Scutellum finely, closely punctate reticulate, the minute aeroles longitudinally arranged. The reticulations of the abdomen somewhat more conspicuous on the iridescent first tergite.

Head dark metallic with reflections, mostly bluish green and violaceous. Scutellum in certain lights almost completely bluish green. Sides of propodeum, mesopleura, and first tergite strongly iridescent

metallic, the former and latter bluish green, the mesopleura bluish green blending with purplish. The remainder of the body shining black. Fifth and sixth funicle joints usually straw colored in contrast to the first four joints which are usually blackish or suffused with brownish. Scape brown or straw colored more or less suffused with fuscous. Pedicel concolorous with the first four funicle joints. Club blackish. Legs mostly blackish. Middle femora with a pale, narrow annulus at base and the apices very slightly pale. Knees of hind legs either blackish or brownish. Knees of fore legs and the tibiae more or less suffused with brownish. Spur of middle tibia blackish. Tarsi white to straw colored, the apical joints faintly brownish.

Length of average sized specimens 2.7 mm.

MALE—

Frontovertex slightly wider than long (6:5). Ocelli in a slightly acute triangle, the posterior pair about one-half their own diameter from the orbits and occipital margin. Antennal sockets at about the center of the face and about their own length apart. Scape short, slightly expanded ventrally towards the apex. Pedicel about as long as wide. The six funicle joints about subequal, each provided with whorls of curved setae. Club solid and about as long as the preceding two joints.

Marginal vein about as long as wide. Cilia of fore wings very fine and hyaline, except for ten or so stronger dark setae marking the edges of part of the speculum.

Antennae brownish or straw colored, the pedicel darker than the remainder. Face and cheeks strongly bluish green and violaceous. Knees of all legs and the apical ends of the fore and middle tibiae brownish to straw colored. Tibial spur of middle legs straw colored. In other respects about like the female.

Length.—1.8 mm.

***Baeoanusia minor* (Silvestri)**

Figure 3

Bothriothorax minor Silvestri, Boll. Lab. Zool., Portici, 9:292-293, 2 figs. 1914.

Baeoanusia africana Girault, Can. Ent., 48(4):114. 1916.

Baeoanusia africana Girault was found to be a synonym when it was discovered that the Eritrean specimens determined as *B. minor* (Silvestri), were in agreement with specimens in the collection from Cape Colony. *B. minor* was supposed to be one of the parasites responsible for the scarcity of the black scale at Nefasit and the discovery of its hyperparasitic character was a disappointment. Prior to the Eritrean investigation this species was known to us only through museum specimens from Cape Town and its synonymy was not suspected. No specimens were ever reared by us in California from

black scale material shipped from South Africa. Rust reared the species in Africa and Froggatt and Gurney reared it in Sydney from black scale sent to Australia by Lounsbury as early as 1903. In the collection of the Department of Entomology, State of New South Wales, are some specimens, said by Mr. Gurney to be in his handwriting, labeled: "Bred from *Lecanium oleae*, from South Africa, from Lounsbury, 23-IX-1903." The specimens from which Girault prepared his description were probably reared many years ago when Lounsbury was collecting black scale for shipment.

Baeoanusia minor was not numerous in any of the samples of black scale collected in Eritrea. The first specimens, one male and four females, issued on May 20, 1930, from scales collected at Asmara and Ez'taclesan. These were confined in a large test tube and provided with unparasitized black scale. The female parasites showed an interest and occasionally one would exert her ovipositor and cursorily touch a scale with it. The same test was repeated on a number of following days without inducing oviposition. On April 20, a twig of *Ficus dekadkana* infested with black scales, some of which were obviously parasitized was introduced into the vial. At this date the original colony of five specimens had been increased by the addition of others. Oviposition immediately took place, the females selecting parasitized scales. On dissecting the scales that were selected by the parasites for oviposition, eggs were always found in mature, primary larvae, presumably those of *Metaphycus lounsburyi* (Howard). Like its congener, this species is able to detect by the preliminary inspection made with the antennae, whether or not the scale is inhabited. Apparently it only oviposits when the primary larvae are about full grown. When ovipositing the parasite stands on the back of the scale and inserts the ovipositor perpendicularly. Sometimes the parasite spends several minutes in drilling a hole in the derm. Deep insertions and partial withdrawals of the ovipositor enable the parasite to locate the primary larva into which an egg is deposited.

The newly laid egg has a short stalk. The bulbous part of the egg measures 0.25 mm. long by 0.1 mm. wide. An egg is shown in figure 3.

This note, although meager, established the fact that this species is hyperparasitic and is to be guarded against.



Fig. 3. *Baeoanusia minor* (Silvestri).
Newly laid egg.