

DESCRIPTION OF SPECIES

Oryctes rhinoceros (Linnaeus, 1758)Larva

Larva of this species may be characterized as follows: full grown larva is creamy white and varies in size, average length being about 75 millimeters, and average breadth about 25 millimeters. Body is long and wide from head to considerably swollen anal segment, but strongly arched. It is sparsely covered with short brownish color hairs. These are not so numerous on the last three abdominal segments. Three pairs of four segmented thoracic legs are present.

Head capsule, or cranium is very well sclerotized, dark brown in color and covered with many prominent pits. Mouthparts projecting forward in a rounded triangular form. Epicranial suture is distinct. The maximum width of head capsule is 11.5 millimeters. Two exterior frontal setae located above each precoila. Anterior and posterior frontal setae are absent. Each anterior angle of frons has seven setae. Two dorsoepicranial setae on each side of the epicranial suture (fig. 30). Labrum is nearly twice as long as the clypeus. Lateral margins of labrum and epipharynx are broadly rounded posteriorly. Epipharynx is slightly convex, roughened and asymmetrical. Left chaetoparia of Oryctes

rhinoceros (Linn.) bears 41 spines and 15 spines on the right (fig. 34). Below the dextotorma and pternotorma there are two rows of setae. Between these two rows of setae there are two pairs of epipharyngeal pores. Mandibles are longer than their width. On dorsal surface of left mandible near mola area there is a row of setae, first two pinaculum each with four setae, third and fourth each with two and fifth to eight each with one (fig. 39). Ventral side of mandible has a distinct broadly oval stridulating area with more than 15 transverse striae and a prominent setae (fig. 40). Left mandible, above the mola area, has two distinct teeth (fig. 39). Right mandible has no distinct teeth (figs. 41, 42). Maxilla is fairly narrow, and has moderately long four-segmented palpi. Galea has a large, black uncus. Lacina armed with three thick spines distally (fig. 36). There are ten isolated obtuse stridulatory teeth placed sub-obliquely along dorsal surface of stipes near external border (fig. 37). Labium is small and bearing a pair of two segmented palpi (fig. 38). Antenna is four segmented, the last segment with five dorsal sensory spots. Ocelli are absent.

Metathorax with two quadriangular brownish sclerotized plates on the sides, just above the spiracles,



each plate bears a row of two to ten setae. Reddish brown colored spiracles are seen laterally on prothoracic and first eight abdominal segments. They are cribriform, 1.8 millimeters long and 1.4 millimeters wide (fig. 43). All spiracles are similar in size and shape. Three pairs of four segmented legs each with black and pointed claw. Fore pair shorter, and hind pair longer than middle pair. Legs are spiny. Metathoracic tarsungula is armed with many large spines and protruding from base of stout claw is a bristle-like (fig. 32).

Dorsum of first to seventh abdominal segments each with three annulets, eighth to tenth without annulets (fig. 29). Each prescutum and scutum is covered with numerous short, stout setae. Raster has more than one hundred irregularly distributed, fairly sharp, straight, flattened teges (fig. 31). There are also many long, slender setae present. Lower anal lip is covered with about 96 small setae which are similar in shape to teges, and it has many long, slender setae present. Anal terminal and transverse.

Pupa

Cocoon is oval, internally smooth and of an earthy appearance. It is brittle and hard. Pupa varies in size, its average length being about 50 millimeters and breadth about

22 millimeters. It is slightly convex dorsally. Surface of pupa is rather smooth and shiny with uniformly reddish brown. Sclerotization of exoskeleton is highly developed. Sides of mandibles, legs and ventral surface of body are clothed with bright reddish brown hairs, Legs and wing-cases distinctly folded on ventrum. There are a series of stridulatory structures on dorsal region of abdomen. Dorsum of last abdominal segment with a dorsoanal groove which extends longitudinally to posterior margin of penultimate segment (fig. 27).

Adult male (fig. 1)

Beetle is black or pitchy, ventral surface reddish brown with similarly colored short tawny pubescence. Size varies, general average length 40 millimeters, and breadth 20 millimeters, according to sex and amount of nourishment taken in larval stage. It is elongate-cylindrical in shape. Head is small and concealed posteriorly by thorax, into which it fits very snugly, that is appears to be subtriangular from above, it also bears a large, erect, slightly curved, tapering horn, two and one-half to four times as long as its width at base, and rather blunt distally (fig. 5). Labrum, sides of mandibles and ventral surfaces of prothorax and mesothorax are clothed with dense purplished red erect hairs. Eyes are

black and shiny and so situated at sides of head as to be half concealed by anterior margin of thorax, and a narrow posteriorly projecting flange from base of horn protects central portion of eye. Head, at base of horn, which extends upward directly from the clypeus, is very deeply pilose or setose. Antennae project from under, outer margin of head. They consist of eleven segments (fig. 9), the apical three of which are thick lamellae, the first is swollen at apex and is as long as the succeeding seven together, and is very strongly pilose, bristles being on its anterior, external surface. The ninth and eleventh segments are also pilose at their outer margins and tips. The tenth, lying concealed between them, is smooth and blade-like. Clypeus is deeply emarginate. Maxilla has stiff hairs and a four segmented palpus, which is strongly swollen anteriorly, are hidden between labium and mandibles (fig. 10). Labium is long, convex, with many long hairs and three segmented palpi are attached to apical part of lateral margin of labium. Its lateral margins are strongly setose and on dorsum of distal portion without setae at base (fig. 13). Mandible is stout, short, curved upward and forward with a short curved blade on lower inner side which operates as a chisel. External mandibular teeth are rounded and curved toward apex (fig. 11).

Cervix consists of a pair of heavily sclerotized, somewhat compressed and sinuate pieces in the sides of neck. Prothorax broader than long, widest behind center, front angle are sharp, hind angles indistinct. There is an approximately oval excavation extending from the front to beyond the middle of disc, and surrounded by a smooth carina which slightly projecting at center of declivity. There is also an elongate depression outside carina on each side, and another in each front angle. All depressions are rugose and the remainder of surface is smooth and shining.

Scutellum is semi-elliptical narrowed and rounded posteriorly, strongly rugose, and with a smooth outer margin. Elytra slightly broader than prothorax, and widest just behind middle, broadly rounded posteriorly. They are strongly and closely punctured, punctures being annular and forming a sutural stria and three outer pairs of striae rather wide apart, with close punctures, these sutural striae do not reach posterior border.

Propygidium is very large and protuberant in both sexes, but in male it is rounded, finely rugose and with some setose, and a hairy strip at anterior margin (fig. 15). Generally has a long horn.

Coxal cavities are large, extending across a large

part of each thoracic sternum. Front tibia is armed with four teeth, the uppermost one small, and there is also a sharp and conspicuous tooth on lower face. Middle tibiae are much shorter than hind ones and all are very acutely digitated at end.

Adult female (fig. 2)

The general structure is similar to adult male, except horn more shorter (fig. 6); size smaller; pygidium is emarginate and densely clothed with tawny hairs (fig. 17).

Male genitalia (figs. 19, 20, 23)

Aedeagus is a large, heavily, sclerotized structure, brown in color, and entirely retracted within the body when copulation is not taking place. It consists of three parts, the anterior of which is the largest part, less pigmented bulbous portion, five millimeters in length and three millimeters in width or occupying nearly two-fifths of the total length. This portion meets with the vas deferens which are at first slender, sinuous and confused with branching accessory glands, and then becoming more slender before joining with the outlets to the accessory glands to form the ejaculatory duct, which is short and strongly thickened till it meets the aedeagus. The central part is sclerotized, and has a deep groove along each side, and the apex articulates

slightly with the terminal portion, it is the longest part, seven millimeters in length. The terminal part, with a strong paired hook-like structure directed slightly backward, at the end consisting of the forceps-like structure. It is five millimeters in length, this part is called the parameres. The parameres are separated dorsally but fused on the ventral side. The central and terminal parts of aedeagus are covered with a tubular membranous tissue. The whole genitalic structure is 17 millimeters in length and four millimeters in width.

Female genitalia (fig. 26)

The female genitalic structures consist of a pair of broad, two segmented lobes, lying on each side of the entrance to the vagina. Basal segment is broad, almost square, and slightly pigmented. The terminal segment more sclerotized, setose, and round in distal outline. Here there are four pairs of sclerotizations, two pairs of which are at the union of the rectum with the vagina. Two of four pairs are narrow and oblique, the other two are wider and transverse. The whole genitalic structure is 8.5 millimeters in length.

Measurements

Body length 39 to 42 millimeters; width 18 to 22 millimeters; male's horn 15 to 16 millimeters in length

4 to 5 millimeters in width; female's horn length 5 to 6 millimeters; 3 to 4 millimeters in width.

World distribution

Ceylon; India; Madras, Bombay; Malabar; Kanara, Bandra; Bengal; Howrah; Tenasserim; Maliwon; Thailand; Annam; Singapore; Pahang; Indonesia; Sumatra, Java, Celebes; Ceram; Amboyna; Philippines Is.; Formosa; Corea; Hongkong.

Distribution in Thailand

O. rhinoceros (Linn.) is an extremely common beetle, found in many parts of Thailand except in the south from Choemporn Province southwards to the border of Thailand. From this studies, the specimens were collected in Cholburi, Rayong, Chachoengsao, Lampon and Chiengmai.

Discussion

Larva of O. rhinoceros (Linn.) may be readily distinguished from O. gnu Mohn. in having 41 spines on left Chaetoparia and 15 on right; one row of setae below dextioterma; two pairs of epipharyngeal pores; ten ridges stridulatory teeth; five dorsal sensory spots on distal antennal segment.

Pupa is characterized only by the dorsoanal groove extends longitudinally to posterior margin of penultimate abdominal segment.

Adult is one of the most serious pests of coconut plantations. The general appearance resembles O. gnu Mohn.. It differs from O. gnu Mohn. in having strongly setose labium; short, stout, dense with hairs mandibles; semi-elliptical scutellum; pygidium is globose with few setose and one strip of bristle in male; aedeagus slender; parameres small; pygidium is emarginated and densely with hairs in female; four pairs of sclerotizations in terminal segment of female genitalia.



Oryctes gnu Mohnike, 1874.

Larva (fig. 29)

External morphology similar to O. rhinoceros (Linn.) except at left chaetoparia with 51 spines and 17 spines on the right; below the dextrotorma has two to three setae or absent and one row of setae below pternotorma; epipharyngeal pore absent (fig. 35). There are eleven stridulatory teeth placed sub-obliquely along dorsal surface of stipes. Seven dorsal sensory spots on distal segment of antenna (fig. 33)

Pupa

Shape, size, color of pupa are very close to O. rhinoceros (Linn.) from which it differs that the dorsoanal groove not extend longitudinally to posterior margin of penultimate segment (fig. 28).

Adult male (fig. 3)

Color is shiny black, form convex and moderately elongate. Average length for the males being 62.5 millimeters.

Head is small, and it bears a horn which is broad at the base and taper to a blunt point. It is rugosely punctured at front but smooth at base behind. Horn is longer and larger in the male than in the female. Male's horn varies in length from 23 to 26 millimeters and in width from five to seven millimeters at its base, the average for male being 24.5 milli-

meters in length and six millimeters in width.

The general structure is similar to Q. rhinoceros (Linn.), except the eleventh antennal segment is rather flat while in Q. rhinoceros (Linn.) is more curved, horn is much longer, and mandible is rather flat and strong emarginate and with few hairs (fig. 12).

Labium is long, convex, middle part of lateral margins without hairs and on dorsum of distal portion will densely setae at base (fig. 14). The first transverse carina of pronotum is prominently trilobate medially which is very distinct in the males but less evident in the females. It is about one-third of the length of the beetle in dorsal aspect and is roughly subcircular in general outline. Anterior two-thirds shows a concave area largely sculptured in a transverse fashion. On each side of anterior angles of pronotum there is an irregular depression, extending around posterior margin of the main depression, is another parenthesis-shaped one, broader anteriorly and having its surface roughly rugose. A line of submarginal punctures extends around pronotum.

Scutellum is triangular; finely rugose; smooth at apex and along sides. Elytra are as wide as thorax. Each elytron has four irregularly and finely punctured striae,



one of which striae reaches posterior border of elytra, the external ones are indistinct toward border. Area between striae is coarsely punctured.

Propygidium is very large, lobate behind, rounded, smooth, shiny and sparsely punctured.

Femora are uniform in size and smooth, each with one row of setose puncture nearer posteroventral margin. Tibiae are nearly similar in shape and size, bearing externally three prominent teeth. Fore tibiae, in addition, have an internal apical one. Middle and hind tibiae have each one internal and three apical teeth and in addition one armed with a row of smaller secondary ones. All tarsi are of about the same shape and size, except that the last joints of anterior ones are slightly longer than the others, and the first of middle and hind tarsi are subconical and slightly larger than the succeeding ones. All tarsal joints are setose at their apices.

Adult female (fig. 4)

Average body length for females being 51.5 millimeters; horn varies in length from ten to eleven millimeters and four to five millimeters in width, the average horn length is 10.5 millimeters and 4.5 millimeters in width.

The principal differences between male and female are that the latter is much smaller and its horn may be a mere tubercle, or, at best, not more than one-third as long as that of the male (figs. 7, 8). The depression on the pronotum extends back less than half-way; posterior lateral rugose areas are somewhat broader. The last ventral abdominal segment of female differs from that of male, is that in the latter it is rounded and with bristle-like hairs (fig. 16), and in the former it is markedly emarginate and with setose. Venter of abdomen of female is partially covered in transverse rows with hairs, except along apical margins segments (fig. 18). Hairs are not as abundant as in O. rhinoceros (Linn.). Pronotum of male is prominently trilobate medially which is very distinct although in female it is less marked.

Male genitalia (figs. 21, 22, 24)

The structure of aedeagus is similarly to O. rhinoceros (Linn.) from which it differs in the following details; it is stouter, the anterior part is four millimeters in length and more thickened, the middle part is stouter and six millimeters in length, and the terminal part is 5.5 millimeters in length, black on the edges and dark brown in the middle. These parameres are larger than those in O. rhinoceros (Linn.).

The whole genitalia is 15.5 millimeters in length and five millimeters in width.

Female genitalia (fig. 25)

The female genitalic structure is rounded and heavily pigmented. The pigment spots are larger than in O. rhinoceros (Linn.). The terminal segment sclerotized, setose and round. There are three pairs of sclerotizations, three of which are narrow and longitudinal, the other three are wider and transverse. The whole genitalia is five millimeters in length and four millimeters in width.

Measurements

Body length 49 to 64 millimeters; width 26 - 28 millimeters; male's horn 23 to 26 millimeters in length; five to seven millimeters in width; female's horn ten to eleven millimeters in length; four to five millimeters in width.

World distribution

Borneo; Philippine Is; Indonesia: Sumatra, Celebes.

Distribution in Thailand

O. gna Mohn. is one of the greatest enemies of the coconut palm in Thailand. It is found only in Narathiwat province in the Takbai and Narathiwat Districts.

Discussion

Diagnostic characters for larva of O. gnu Mohn. are : 51 spines on the left chaetoparia and 17 on right; few setae or absent below the dextiotorma; epipharyngeal pore absent; eleven ridges stridulatory teeth on dorsum of maxilla; seven dorsal sensory spots on distal antennal segment.

Pupa can be characterized by dorsoanal groove which extends longitudinally one-half of dorsal length of last abdominal segment.

Adult may be characterized as follows: labium without setose on the lateral margins, and dorsal surface of distal portion with setae; flat, more elongate, and less hairy mandibles; triangular scutellum; pygidium is globose and bare, one strip bristles in male; stout aedeagus, large parameres; pygidium is emarginated and few setose, and two transverse rows of hairs in female; three pairs of sclerotization structures in terminal segment of female genitalia.