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Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., late commanding.—Series II., No. 1. *On the Results of the Deep-sea Dredging during the Season 1890-91 (continued).* By A. ALCOCK, M.B., Surgeon-Captain I.M.S., Superintendent of the Indian Museum.

[Continued from p. 245.]

IX

Family Galatheidæ.

MUNIDA, Leach.

75. *Munida militaris*, Henderson, var. nov. *andamanica*.

The length of the carapace is very little more than its greatest breadth. The uptilted rostrum is a good deal more than half the length of the carapace and more than double the length of the slightly divergent supraorbital spines; it extends backwards as a faint carination of the front half of the gastric region. The anterior border of the carapace on either side of the rostrum is convex and slightly oblique; the posterior border is smooth; the lateral borders are armed with 7 (2+3+2) spines. The transverse ridges are strongly developed and finely and faintly beaded, and are thickly fringed with setæ, some of which at regular distant intervals are long. The gastric area is armed in front with a convex row of spines, of which only two, namely those in the immediate rear of the supraorbital spines, are conspicuous, while of the others the outermost one on each side is the largest and stands far back.

A small spinelet is present on each side immediately behind the bifurcation of the cervical groove. The cardiac area is usually well defined by a zigzag incision.

The abdominal terga have the transverse ridges well developed and setose; the second only is armed, having on its anterior margin a row of 8 distant spinelets.

The eyes are large, the major diameter of the moderately flattened corneal region being between one third and one fourth the length of the carapace; conspicuous setæ fringe the corneal region, and the pigmentation of the latter varies from slate-grey to cinnamon-brown.

The spines of the basal joint of the antennular peduncles are long and needle-like.

The antennal peduncles are smooth; the basal joint has its

antero-internal angle produced into a spine which is not visible from above, and the second joint has both its anterior angles produced into long sharp spines; the flagellum is about three times the length of the body.

Of the external maxillipeds the ischium has its inner edge finely, sharply, and very regularly toothed throughout, and the meropodite has two large spines on its inner edge.

The thoracic legs are comparatively short and stout. The chelipeds when fully extended only just exceed the fully extended body in length without the rostrum in the male, and in the female only just equal the body without the rostrum, and from the ischium outwards they are hairy and granular; the prismatic meropodite has the upper edge throughout and the inner (lower) edge in its distal half spiny, and ends above in two huge spines, the inner edge and the granular outer edge ending in smaller spines; the carpus has spines in two rows on its upper and outer surface and two or three obliquely placed spinules on its inner surface; the propodite in the upper and outer surface of its palmar portion has three rows of spines; the fingers are rather longer than the palm and are closely and evenly toothed, the immobile finger having usually a large spine near the middle of its outer edge and terminating in a pair of large spines, between which the tip of the dactylopodite closes.

Of the second, third, and fourth thoracic legs the upper (anterior) edge is closely fringed with long hairs from the base of the ischium to the tip of the claw; in all the merus and the carpus have the upper (anterior) edge strongly spined, and the merus, propus, and dactylus have the posterior edge serrate or spinulate.

The branchial formula conforms to type.

This subspecies has often been dredged in the Andaman Sea, and appears to be gregarious. On the present occasion several specimens of both sexes were dredged at Station 115, 188-220 fath.

The largest male measures 54 millim. and the largest female 56 millim. from the tip of the rostrum to the end of the telson.

Colours in life: cephalothoracic region and appendages pink, abdominal region white.

The characters are quite constant throughout a large series of individuals of both sexes.

76. *Munida squamosa*, Henderson, var. nov. *prolixa*.

The length and the greatest breadth of the carapace are nearly the same. The almost horizontal rostrum is one

third the length of the carapace, and the orbital spines, which are slightly inclined upwards, are two thirds the length of the rostrum,—all three being very distinctly squamous. The anterior margin of the carapace on either side of the rostrum is concave and without any obliquity; the posterior margin has a pair of spines, one on either side of the middle line; the lateral margins are armed each with five spines. The gastric area is very distinctly delimited and is armed in front with two (and only two) spines, which stand immediately behind the supraorbitals and are about a third the length of these. The cardiac area also is very distinctly defined, and is surmounted centrally by a large spine and flanked on each side, just behind the bifurcation of the cervical groove, by a similar spine. The transverse ridges are well developed and are strongly and sharply beaded and thickly and very finely setose.

The abdominal terga also are most beautifully sculptured with similar ridges, transverse and concentric; the second, third, and fourth terga are armed on their anterior margin each with four distant spines, the middle pair of which are large and conspicuous, and the fourth also has in its hinder portion and in the middle line a single spine.

The eyes are large, their major diameter being more than one fourth the length of the carapace, and the eye-stalks on the upper surface have several setose squames; the corneal region is compressed and closely fringed with setæ at base.

The spines on the basal joint of the antennules are not large, only the outer terminal spine and the anterior of the two marginal spines being of noticeable size.

The antennal peduncles are scaly; the basal joint has a small tubercle at its internal angle, and the second and the third joints have each a spine in the same situation; the flagellum is very little longer than the chelipeds.

The external maxillipeds are very hairy and have the exposed surface of the ischium and merus scaly, the former joint being serrated, up to a large terminal spine, along the inner edge, and the latter having a similar spine near the middle of the inner edge.

The thoracic legs are long, slender, and most remarkably squamous, the scales being fringed with fine setæ. The chelipeds, which are relatively both stouter and longer in the male, are in that sex one third of their own extent longer than the body with the rostrum, being also a little unequal; the merus, which is almost square in transverse section, has three regular rows of spines on its upper and inner face; and the carpus and propodite, which are almost cylindrical,

have each two irregular rows of spines on the inner face, the propodite also having two or three spines on the outer aspect; the fingers are about two thirds the length of the palm and are finely toothed, the immobile finger having a second series of 5 or 6 large teeth and ending in a pair of claw-like spines, between which the tip of the dactylus shuts.

Of the second, third, and fourth thoracic legs the merus has both edges spiny, the anterior the more markedly so; the carpus has the anterior edge spiny, the posterior edge having only a single terminal spine; the propodite has the posterior edge distantly spinulate; and the dactylus has the anterior edge crenulate.

The first abdominal appendages are absent in the male.

Colour in life dull red.

Dredged at Station 115, 188–220 fath.

The largest male measures 42 millim. and the largest female 41 millim. from the tip of the rostrum to the end of the telson.

The spermatozoa of this form, which I have had an opportunity of examining in a specimen lately sent from the 'Investigator,' are remarkable for their size, but still more for their form. As teased out from a piece of the sperm-tube they consist of an elongate oval head which gradually tapers to a long lash-like tail. They have, in fact, much the appearance of flagellate spermatozoa of gigantic size, only the end of the flagellum is truncated and split into two little lips, and the head is connected at its front end by means of a short twisted filament with a sucker-like plate. In structure the head and the tail throughout its whole extent are alike, consisting of a granular core, which stains deeply with carmine, and an outer clear structureless envelope, which remains unstained.

77. *Munida tricarinata*, sp. n.

Belonging to the group *Munida granulata*, *scabra*, and *proxima*, Henderson, and *Munida obesa*, Faxon.

The length of the carapace and the greatest breadth are equal. The entire carapace is covered with spinelets arranged in longitudinal and transverse rows. The rostrum is less than one fourth the length of the rest of the carapace and not very much longer than the supraorbital spines; it is continued backwards to the after border of the carapace, first as a sharply spinulate carination of the front half of the gastric region, then as a row of 3 close-set spines traversing the posterior half of the gastric region, then as a row of 3 more distant spines traversing the cardiac region, and terminates

as a large spine on the posterior margin of the carapace. On either side of this rostral series of spines the orbital spine also is continued backwards as a gently divergent series of rather smaller spines, so that the carapace is dorsally traversed by three sharply spinate carinæ. The anterior margin on either side of the rostrum is concave, without any obliquity; the posterior margin is raised and closely spinate throughout; on the lateral margins the spinature is hardly to be distinguished from the general spinature of the surface, the antero-lateral spine alone being large.

Abdominal terga with the transverse and concentric ridges well developed; the first tergum is remarkably broadly exposed and has the entire surface sharply rugose; the second and third have their anterior edge and their principal transverse ridge spinate, two of the spines in every case, namely those on either side of the middle line, being large; the fourth has the anterior edge only armed in an exactly similar manner.

The eyes are large—the major diameter one fourth the length of the carapace—and much compressed; the corneal region is remarkably narrow and the setæ that fringe its basal margin overlap the eye in front; in addition to these setæ there are three half-rings of setæ on the eye-stalks.

The basal joint of the antennal peduncle has its antero-internal angle produced into a great serrated hairy spine about half as long as the carapace, the spines of the two sides converging in front of the eyes; the antennal flagellum is not much more than two thirds the length of the body with the rostrum.

The external maxillipeds are very hairy, and the merus has a strong spine on the inner edge near the proximal end.

The chelipeds (in the female) are one half longer than the body with the rostrum, are slender and cylindrical, and are remarkable for the great length of the carpus, which is equal in length to the palm of the propodite or more than two thirds the length of the meropodite; all the joints are sharply squamous, the scales on the meropodite, and to a less extent on the carpus (except on the under surface of these joints), forming spines; the fingers are rather more than two thirds the length of the palm, the opposed edges are finely and closely serrated, the immobile finger having also a second series of distant large teeth and ending in a pair of claws between which the tip of the dactylus closes.

The second, third, and fourth legs have the merus and carpus strongly spinate along both edges, the propus finely

serrate on the posterior edge, and the dactylus crenate on the front edge.

An ovigerous female from the Andaman Sea, 112 fath. : length 29 millim. from tip of rostrum to end of telson.

78. *Munida microps*, sp. n.

Very closely related to *M. microphthalmia*, A. M.-Edw.

The breadth of the carapace is barely three fourths of the length (without the rostrum). The rostrum, which is strongly upcurved and is indistinctly serrated at tip, is considerably more than half the length of the carapace and considerably more than double the length of the divergent supraorbital spines; it extends backwards as a faint carination of the anterior third of the gastric region. The frontal border on either side of the rostrum is convex and slightly oblique; the posterior border is raised but unarmed; the lateral margins are armed with 7 (2+3+2) spines. The transverse ridges are strongly developed, smooth, and thickly fringed with short setæ. The tumid gastric area bears in front a convex row of spines, only two of which, namely those which stand immediately behind the supraorbital spines, are conspicuous, the outermost spine on each side being placed far back on a level with the centre of the hepatic region. The cardiac area is well defined and is bounded on each side by a spine standing immediately behind the bifurcation of the cervical groove. A spinule or two are found within the area enclosed by the bifurcation of the cervical groove.

Abdominal terga each with one or two smooth setose ridges; the second tergum only is armed, having 6 to 8 spines on its front edge.

The eyes are small, with the cinnamon-coloured corneal region hardly compressed and little dilated, its major diameter being about one eighth the length of the carapace.

The spines of the basal joint of the antennular peduncle are long and needle-like.

The antennal peduncles are smooth; the basal joint has its internal angle produced into a stout spine, which, however, is not visible from above, and the second joint has both its anterior angles produced into long acicles; the flagellum is of great length.

The external maxillipeds are slender, almost smooth, and but slightly hairy; the inner edge of the ischium is sharply toothed throughout and the inner edge of the merus near the proximal end bears a very prominent spine.

The thoracic legs are slender, smooth or very faintly

squamous, and very slightly hairy. The chelipeds in the male—in which sex they are not quite symmetrical—exceed the length of the fully extended body, measured with the rostrum, by rather more than a carapace length, and in the female by half a carapace length; the merus and carpus and the propus in its palmar portion are covered with large thorns; the fingers, which do not quite equal the palm in length, are evenly and finely toothed, and the immobile finger has also several distant spines along its outer margin, and at the base of the terminal claw a pair of small teeth, between which the tip of the dactylus closes.

Of the second, third, and fourth thoracic legs the merus has both its margins and the carpus its front margin thorny, the posterior margin of the carpus having only a long terminal spine, while the propus and dactylus have their posterior edge serrated for a series of minute articulating spinules.

The first pair of abdominal legs in the male have the usual development.

Colour in life milky pink.

Several males and females from Station 112, 561 fathoms.

The largest male measures 45 millim., and the largest female 43 millim., from the tip of the rostrum to the end of the telson.

This species has also been dredged off Colombo in 675 fathoms. It appears to be gregarious.

I have to separate provisionally from this species, as illustrating a variety, two large males which only differ from the above type in the nature of the chelipeds:—

79. *Munida microps*, var. *lasiocheles*, nov.

Differs from *M. microps* only in the structure of the chelipeds, which (in the male) are markedly unequal, one (the right in one individual, the left in the other) exceeding its fellow by nearly the whole length of the dactylus.

The chelipeds are very densely furred, except on the short ischium, and are from nearly twice to two and a half times the length of the fully extended body measured with the rostrum; they are thorny, much as in *M. microps*, except that the thorns are relatively smaller, especially on the propus, and most of all on the propus of the larger cheliped, where they are almost entirely hidden in the thick fur. The fingers are not much more than half the length of the palm; and while in the smaller claw they are straight, closely apposed, and otherwise the same as in *M. microps*, in the

larger claw they are separated throughout, but especially at the base, where there is found on the dactylus a large truncated tubercle and on the immobile finger a corresponding excavation and bulging. The carpus of the shorter claw has a strong bend outwards.

Two males were dredged in the Andaman Sea, along with *M. microps*, at 480 fathoms. The largest measures 60 millim. from the tip of the rostrum to the end of the telson, and 175 millim. from the tip of the extended larger cheliped.

MUNIDOPSIS, Whiteaves.

80. *Munidopsis stylirostris*, Wood-Mason.

Munidopsis stylirostris, Wood-Mason, Ann. & Mag. Nat. Hist., Feb. 1891, p. 201.

The general surface of the body is finely pubescent dorsally.

The greatest breadth of the carapace is about three fourths of the greatest length (without the rostrum). The rostrum, which is styliiform and strongly upcurved, is nearly two thirds of the carapace in length; the front margin of the carapace is slightly oblique, and is unarmed except for a strong spine at the antero-lateral angle, and the lateral margins, which are parallel throughout or even a little divergent anteriorly, are, except for the antero-lateral spine, either unarmed or only slightly rugose anteriorly; the posterior margin is raised, but is quite smooth; the tumid gastric region is marked by the presence of rugosities which anteriorly culminate in a pair of coarse spinelets, one on each side of the middle line.

The abdominal terga from the second to the fourth inclusive are transversely channelled, both margins of the channel being raised into finely ctenate crests.

The eye-stalks, which are very stout and very short, are not united, are freely movable, and are not prolonged beyond the globular corneæ.

The greatly inflated basal joint of the antennulary peduncles has the two external terminal spines very strong and long, projecting far beyond the eyes.

The antennary flagellum is not much longer than the chelipeds.

The external maxillipeds have the inner edge of the ischio-podite evenly toothed throughout and the lower edge of the meropodite furnished with two large unciform spines near the proximal end.

The thoracic legs, except the ischiopodite of the first pair, are almost devoid of hairs.

The chelipeds are robust and are not quite symmetrical on both sides, the longer one being about an eye-length shorter than the fully extended body (measured with the rostrum); their meropodite and carpopodite have each a terminal ring of four spines, the meropodite also having a series of distant spinelets along the upper margin in continuity with a terminal spine on the upper edge of the ischiopodite, and the last-named joint having also a terminal spine below; their fingers, which are barely equal in length to the inflated palm, are finely and evenly toothed up to the very tip, are capable of very complete apposition, and when shut form a pronounced spoon.

The second, third, and fourth thoracic legs are at least two thirds the length of the chelipeds, and have the meropodite and carpopodite granular (the former joint with a pair of terminal spines above, the latter with a single one), and the curved dactylopodite furnished on its posterior margin with a row of spines hardly smaller than the terminal claw.

The abdominal legs of the male, excepting the first and second pairs, are quite rudimentary.

The length of the largest male from the tip of the rostrum to the end of the telson is 45 millim.

Colours in life milky orange, fading to milk-white on the carapace and sternum; corneæ milky yellow.

Laccadive Sea (Stations 107 and 109), 738 fathoms.

81. *Munidopsis dasypus*, sp. n.

Nearcest to *M. Sigsbei*, A. M.-Edw.

Body pubescent; thoracic legs densely covered with long hairs.

The greatest breadth of the carapace is about three fourths the greatest length. The rostrum, which is styloform, gently ascendant, and slightly curved at tip, is a little more than half the length of the carapace; the front margin of the carapace is markedly oblique and is unarmed, except for a small antero-lateral spine; the lateral margins are parallel, with a slight convergence in the anterior third, where there are two spinelets behind the antero-lateral spine; the posterior margin is raised and bears four strong spines in its middle third; the general surface of the carapace is smooth and polished anteriorly, and is marked posteriorly by slight transverse ripples.

The anterior abdominal terga have a faint naked transverse groove.

The eye-stalks, which are slender and comparatively long, are not prolonged beyond the globular corneæ, are not united, and are freely movable.

The inflated basal joint of the antennary peduncle has only one of its spines, namely that at the antero-external angle, long.

The antennary flagellum is not much longer than the chelipeds (in the female).

The ischiopodite of the external maxillipeds has the inner edge evenly toothed and the lower edge prolonged distally into a huge spine, while the meropodite has two strong spines on the lower edge in the proximal half.

The thoracic legs, except the fifth pair, are thickly covered with long hairs. The chelipeds are long, slender, and slightly asymmetrical, the longer one exceeding the length of the fully extended body (with the rostrum) by the extent of the dactylopodite; their ischiopodite has two strong distal spines, one above, the other below, their meropodite two rows of spines along the upper and inner surface and a terminal ring of four spines, and the carpopodite has a terminal ring of three spines; the slender fingers, which are finely and evenly toothed to the very tip, slightly exceed the elongate palm in length.

The second, third, and fourth thoracic legs are relatively short, the second pair barely, and the others less than, half the length of the chelipeds; in all the meropodite and carpopodite have the anterior edge spinate, and the dactylopodite has the terminal claw but slightly curved and very much longer than the spines along the posterior edge.

An egg-laden female from Station 112, 561 fathoms, measures 44 millim. from the tip of the rostrum.

Colours in life uniform milky orange.

82. *Munidopsis scobina*, sp. n.

Nearest to *M. erinacea*, A. M.-Edw., *M. spinifera*, A. M.-Edw., and *M. Agassizii*, Faxon.

Body and appendages almost devoid of hairs, but with the spinature sharp and distinct.

The greatest breadth of the carapace is about six sevenths of its length. The rostrum, which is styliform and slightly recurved at tip, is not quite half the length of the carapace; the frontal border is very slightly oblique and, except for one or two small spinelets above the base of the antennæ, is

smooth; the lateral borders, which are convergent anteriorly, are from six- to ten-spined; the posterior border is raised and is surmounted by a series of about ten spines; the gastric region bears a pair of spines at the base of the rostrum and a row of spines along the middle line, and this row is continued along the cardiac region, some of the spines there being bifid or trifid; on the branchial regions are numerous sharp tubercles and spines.

The abdominal terga and pleuræ are glabrous; the second, third, and fourth terga are deeply channelled transversely, the edges of the channel forming sharp and very evenly spinate crests.

The eye-stalks are very short, free and freely movable, and not prolonged beyond the ovoid corneæ.

The basal joint of the antennular peduncles has three large terminal spikes of nearly equal length.

The spines on the joints of the antennal peduncles are remarkably distinct and the flagellum is about twice as long as the body.

The ischiopodite of the external maxillipeds is evenly toothed along the inner edge and has a terminal spine on the lower edge, and the meropodite has two spines near the proximal end on the lower edge.

The thoracic legs are granular, or squamous, or spinate. The chelipeds are somewhat longer, but hardly stouter, than the second, third, and fourth legs, and in the male they are somewhat longer and in the female somewhat shorter than the fully extended body (with the rostrum); all their joints except the first and last are more or less thorny; the fingers are long, slender, and finely toothed, being in the male a little longer than, and in the female about the same length as, the palm.

The second, third, and fourth legs have the anterior edge of the ischiopodite and carpus thorny and the teeth on the posterior edge of the dactylopodite small.

The abdominal legs of all but the first two pairs are rudimentary in the male; those of the first pair are absent in the female.

Length of the male 40 millim., of the female 42 millim. (measured from the tip of the rostrum).

Dredged at Station 120, 240 fathoms.

83. *Munidopsis subsquamosa*, Henderson,
var. nov. *pallida*.

The carapace to the very tip of the rostrum is covered with

hairy squames arranged in transverse series; its greatest breadth is about six sevenths of its length. The rostrum, the length of which is about two fifths that of the carapace, is broad, being at its base nearly one third the breadth of the carapace, triangular, and strongly carinated, and upcurved and serrated at tip; the frontal border is in the same convex curve with the anterior portion of the lateral borders, it bears on each side two strong spines, and there is also a strong antero-lateral spine, and the lateral borders are armed in addition with three or two spinules; the posterior border is raised and quite smooth; the gastric and cardiac regions are well defined, the former having a pair of spines on the middle line in front.

The abdominal terga and pleuræ are squamous and hairy, but are not spinate; the second, third, and fourth terga are grooved transversely.

The eye-stalks, which are short and stout, are united with one another at base and are almost immobile, each is prolonged beyond the cornea into a stout spine, which projects obliquely from beneath the base of the rostrum, to which, at first sight, it appears to belong.

The basal joint of the antennular peduncles is stout, but not inflated; of the two external terminal spines only one—the lower—is large and conspicuous.

The antennary flagellum is three times as long as the cheliped.

The external maxillipeds are short and slender, the ischium having the inner border finely ctenate and the meropodite having the lower border irregularly crenulate.

The thoracic legs are granular, or squamous, or spinulate, and moderately hairy.

The chelipeds are shorter and not very much stouter than the second, third, and fourth legs, their length being considerably less than half that of the body (with the rostrum); in the male they are slightly asymmetrical; the meropodite and carpus have each a terminal ring of spinelets, and the fingers, which are longer than the inflated palm, are coarse, and are excavated *en cuillère* at tip, being closely crenulate round both edges of the spoon-shaped tips, but not toothed in the proximal half.

The second, third, and fourth thoracic legs have the joints remarkably prismatic and the carpus and propodite strongly fluted; in all the anterior border of the meropodite and carpopodite is spinate, and the teeth on the posterior border of the long dactylopodite are small.

The abdominal legs, except the first two pairs, are rudimentary in the male.

Length 59 millim., measured from the tip of the rostrum.

Colour in life brilliant white.

Dredged at Station 118, 1803 fathoms.

The variety differs from the typical form in having only two gastric spines, in having the rostrum broader, in having the cardiac area more distinctly delimited, and in the strongly fluted fifth and sixth joints of the second to fourth thoracic legs.

ELASMONOTUS, A. Milne-Edwards.

84. *Elasmonotus cylindrophthalmus*, sp. n.

Nearest to *Elasmonotus longimanus*, A. M.-Edw., and to *Elasmonotus carinipes*, Faxon.

The carapace is quadrangular, with the antero-lateral angles simply rounded and the surface and borders perfectly smooth, the greatest breadth being about three fourths of its length. The rostrum is triangular, flat, and horizontal, with the extreme tip slightly upturned; the frontal margin, which is faintly lobed on either side of the rostrum, meets the lateral margins, which are almost parallel, at right angles; the raised posterior margin is smooth; two deep grooves, one of which crosses the cardiac region, pass across the carapace transversely.

The abdominal terga and pleuræ are perfectly smooth; the terga, from the second to the fourth, are transversely grooved, the edges of the groove being salient but smooth; in the case of the fourth tergum the posterior edge of the groove forms a strongly convex eminence.

The eye-stalks, which are slender and extremely short, are free and freely movable; the corneæ are remarkably long and cylindrical, their length being about two thirds that of the rostrum.

The basal joint of the antennular peduncles has two external terminal spines, these being the only spines found upon the animal.

The antennal peduncles are long and slender, the antero-external angle of each of the second to fourth joints forming a tooth.

The external maxillipeds are long and slender, the ischium having the inner edge finely toothed, and the meropodite having two small tubercles on its lower edge near the proximal end.

The thoracic legs are perfectly smooth and hardly pubes-

cent. The chelipeds are long—one half longer than the body and more than three times as long as the other legs,—slender, and cylindrical; the fingers, which are not two thirds the length of the palm, are singular in being rather hairy.

The second to fourth thoracic legs are slender and extremely short, being not quite as long as the carapace (with the rostrum); they all have the meropodite strongly carinated along the anterior border and the dactylopodite (which has the usual spiny posterior border) short.

Colours in life milky red above, milk-white below.

An egg-laden female from Station 115, 188–220 fathoms, measures about 24 millim. from the tip of the rostrum.

[To be continued.]