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**HARRIETELLA SIMULANS (T. SCOTT, 1894), A
COMMENSAL COPEPOD ON LIMNORIA LIGNORUM
(RATHKE)**

by

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In April 1949 Mr. J. A. W. Lucas, a student of Biology and a careful collector of marine animals, supplied the Rijksmuseum van Natuurlijke Historie at Leiden with some specimens of *Limnoria lignorum* (Rathke), found in logs of wood washed ashore near Katwijk. These Isopods proved to be infested by a small Harpacticoid Copepod and by a species of Ostracod. These animals were occasionally observed on the oral appendages and the legs. The Copepods were attached to various parts of the carapace, usually the telson, and were very small (about 0.5 mm) and the identification met with considerable difficulties. They proved to be identical, at last, with *Harrietella simulans* (T. Scott, 1894), a species known from the Firth of Forth and the Firth of Clyde in Great Britain and from Drøbak in Norway. A description of the specimens and a discussion of the synonymy, distribution and bionomics are given below. The Ostracods have not yet been identified.

***Harrietella simulans* (T. Scott, 1894)**

? *Laophonte simulans* T. Scott, 1894, p. 248, pl. 7 figs. 24-32, pl. 8 fig. 1.

Harrietella simulans, T. Scott, 1906, p. 464, pl. 11 figs. 9, 10; Sars, 1920, p. 73, pl. 49; Pesta, 1927, p. 44.

Laophonte brevifurca (?) Stephensen, 1936, p. 4, fig. 1.

Material.

5 adult females and one immature female from *Limnoria lignorum* (Rathke). Katwijk, in submerged logs of wood, washed ashore Febr. 20, 1949. Leg. J. A. W. Lucas.

1 adult female from *Limnoria lignorum* (Rathke). Noordwijkerhout-Zandvoort, in logs of wood found on the shore March 2, 1949. Leg. J. A. W. Lucas.

Female, adult stage. Total length 0.41-0.50 mm. Body depressed, pyriform, with the greatest diameter at the 2nd thoracic segment (fig. 1b). Anterior portion of the body almost ovoid in outline, urosome narrowed. Cephalic

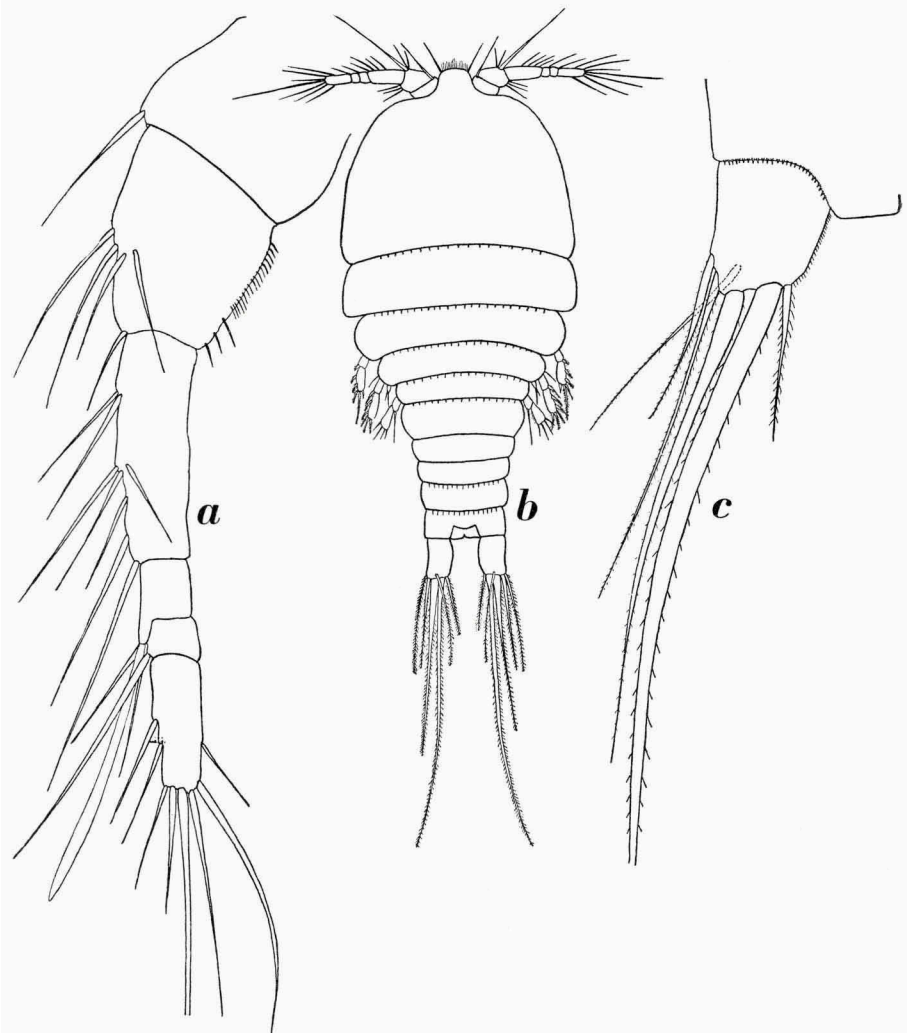


Fig. 1. *Harrietella simulans* (T. Scott). a, left 1st antenna; b, whole animal, dorsal view; c, furcal ramus of right side, ventral view. a, $\times 500$; b, $\times 150$; c, $\times 500$.

somite composed of the head and the 1st thoracic segment, trapezoidal, provided in front with a broad, square rostrum, which is flattened at the apex and carries two strong rostral appendages and a fringe of hairs. At the base of the rostrum a dark spot is visible, indicating the contents of the stomach;

there is no eye spot as indicated by Sars (1920, pl. 49) and Scott (1906, pl. 11 fig. 9). 2nd and 3rd thoracic segments provided with distinct lateral prolongations, which are not so well marked in the present specimens, however, as apparently in Sars' specimen. 4th thoracic segment with rounded sides. 5th segment short. All segments of the anterior portion of the body

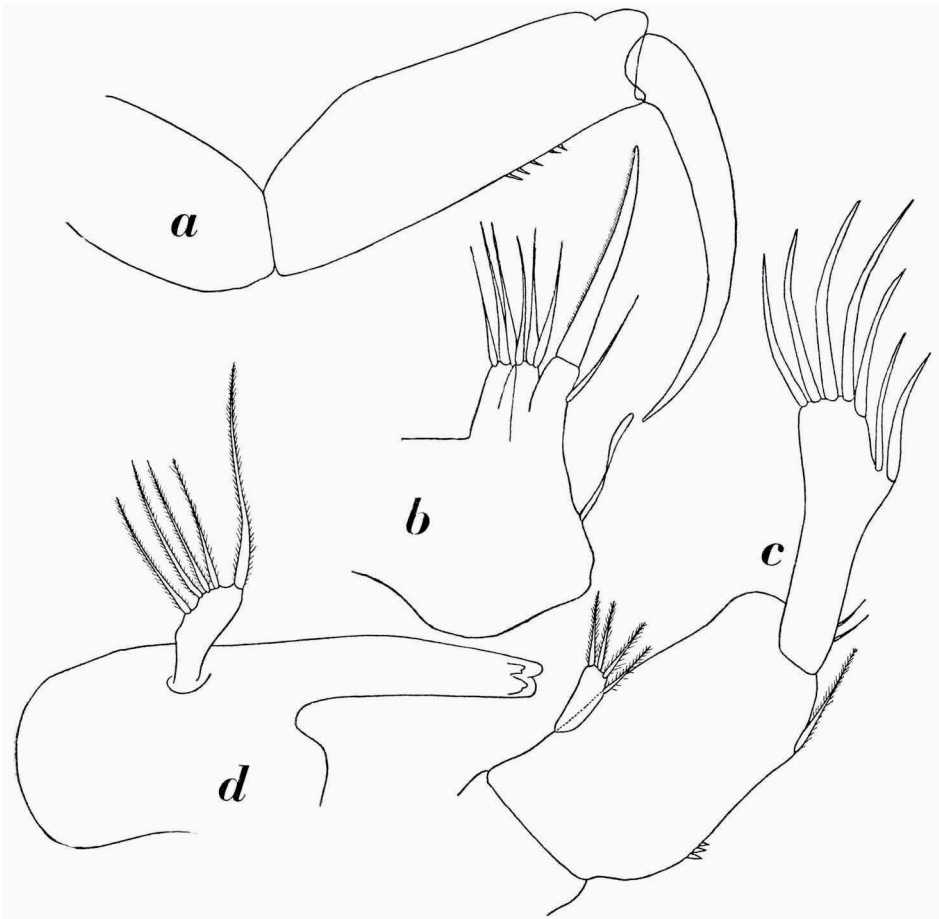


Fig. 2. *Harrietella simulans* (T. Scott). a, left maxilliped; b, left 2nd maxilla; c, left 2nd antenna; d, left mandible. a, c, $\times 900$; b, d, $\times 1000$.

are finely denticulated along the dorsal part of the posterior margin. Genital segment long and broad, distinctly divided into two halves by a fine line of separation; the two following segments small, tubular, finely denticulated along the posterior border. Anal segment with distinct anal flap, which is minutely haired. The total length of the posterior portion of the body (5th

thoracic segment included, furca excluded) is $\frac{1}{2}$ of that of the anterior division, rostrum included. Furcal joints slightly longer than the anal segment, dorsally about twice as long as wide. External margin straight, internal margin slightly convex. Apical margin of each ramus provided with 5 setae. The internal seta is very small; 2nd internal seta big and much lengthened, finely plumose. 3rd seta almost as strong as the 2nd, but only half as long. 4th and 5th setae small and thin. In addition one fine seta is attached to the dorsal surface of the furca, at the base of the 2 strong marginal setae. The whole carapace is rather strongly chitinized and covered with short, fine hairs, especially visible along the lateral borders of the various segments.

1st antenna short, 6-jointed, 3rd joint rather long, 1st and 2nd of almost the same length (fig. 1 a). The various joints carry a number of fine setae, the arrangement of which is illustrated in fig. 1 a. The 2nd segment, along its internal border, carries some fine hairs; in addition 3 strong, almost setiform, hairs are found at the distal end of the margin of that joint.

2nd antenna with a short 1st basal joint (fig. 2 c). 2nd basal joint about 3 times as long as wide, carrying a short exopod at about $\frac{1}{3}$ of its length. There are some teeth along the internal border of that joint and a finely plumose seta near the articulation with the endopod. Endopod 1-jointed, with 5 strong, slightly hook-shaped spines along the apex. Two of such spines are also found along the internal margin some distance from the apex; two strong hairs are found along the basal portion of that margin. Exopod 1-jointed, with 4 plumose setae at the apex.

Mandible with a strong and much chitinized manducatory plate (fig. 2 d). The cutting edge is armed with 4 strong blunt teeth. Palp unsegmented, with 4 moderately strong and 1 very strong seta along the apex.

The 1st maxilla was slightly damaged in my dissected specimen, so that the structure, as described here, has been more or less reconstructed from some other, complete specimens too (fig. 3c). There are 3 internal lobes. The 1st internal lobe, born on the 1st segment (gnathobase) is well developed and carries 8 spines of variable thickness. The two remaining internal lobes each have one rather strong and 2 much smaller setae. There is a vestige of an exopod, carrying 2 fine setae. Moreover, three small, additional setae are found on the 3rd segment of the maxillula, representing the remainder of the endopod.

2nd maxilla very small and, with the exception of some of the setae, only slightly chitinized (fig. 2b). There are three distinct lobes in my dissected specimen, the distal lobe bearing a strong and slightly curved setiform spine and a small seta. In Sars' figure (l.c., pl. 49) two more setae are found on

that lobe, which I have not observed here, but which may have been hidden by the strong spine on that lobe. The two proximal lobes each have three fine setae. I have not observed a vestige of the endopod; one more or less filiform appendage is found at the distal border of the 2nd maxilla and apparently represents the rest of the endopodal setae. Sars seems to have

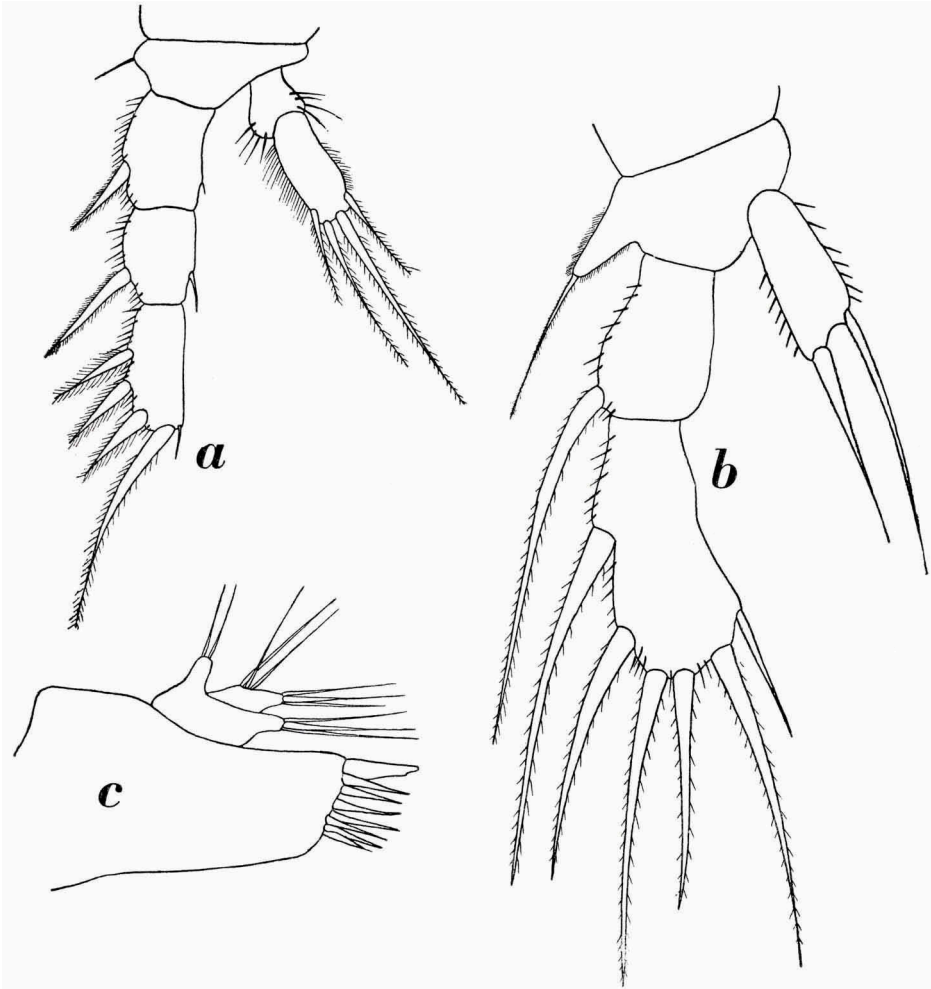


Fig. 3. *Harrietella simulans* (T. Scott). a, right 3rd leg, anterior surface; b, right 4th leg, anterior surface; c, left 1st maxilla. a, $\times 600$; b, $\times 1000$; c, $\times 900$.

observed at least 3 of such appendages; only one has been traced here.

The maxilliped is composed of two joints, the proximal short, the distal elongated, four times as long as wide and carrying some scattered, stiff hairs along the border (fig. 2a). The apex of that joint carries a strong

hook, forming a powerful clasping organ with the distal joint. The hook is nude and tapers into an acute point.

1st leg composed of a 2-jointed basal portion and two rami (fig. 4a). Basal joints well developed, of about the same length. Endopod 2-jointed

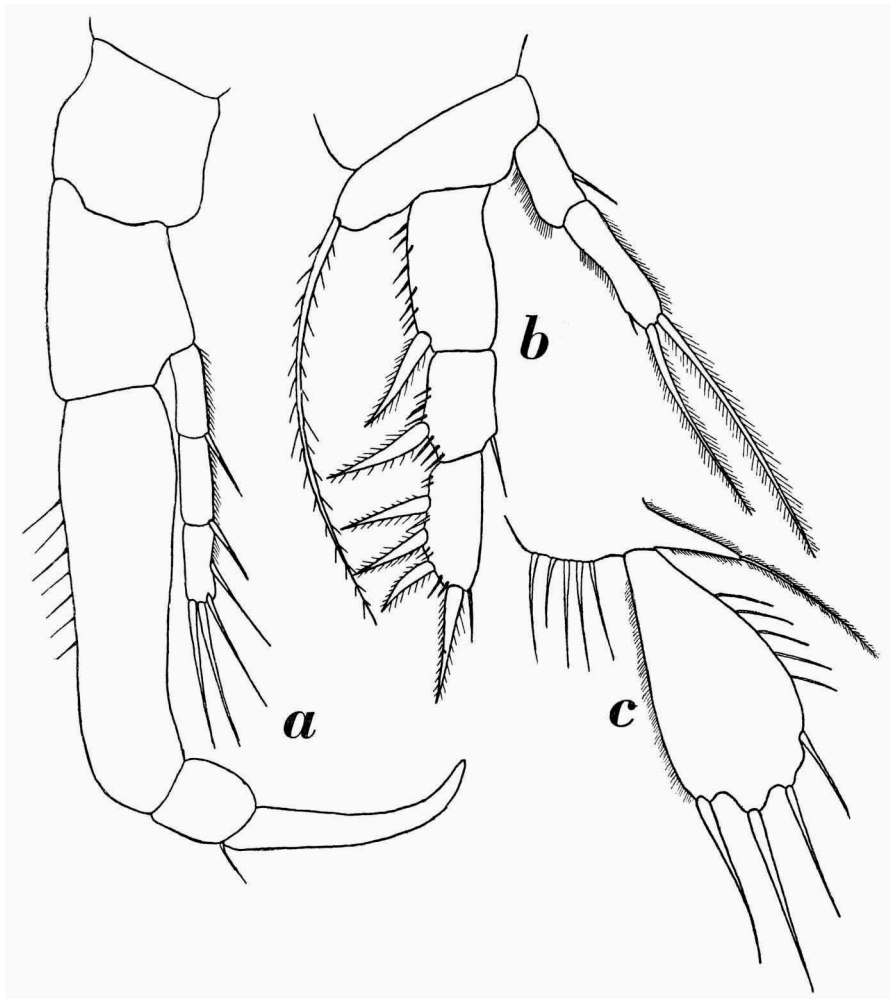


Fig. 4. *Harrietella simulans* (T. Scott). a, left 1st leg, anterior surface; b, right 2nd leg, anterior surface; c, right 5th leg, anterior surface. e, b, $\times 650$; c, $\times 1100$.

or 3-jointed if the hook is considered as the 3rd joint. 1st endopodal joint elongated, 4 times as long as wide, with some long hairs along the internal border. 2nd joint short, carrying a strong, slightly curved hook. The hook tapers into a blunt point; a fine hair is found along the internal border near

the articulation with the 2nd endopodal joint. Exopod 3-jointed, total length scarcely exceeding half the length of the 1st endopodal joint. External margin of the exopodal joints haired, the 1st and 2nd each with one outer edge spine, the 3rd joint with totally 4 setae.

2nd leg biramose, basal joints small, the 2nd with an external prolongation, which carries a strong, haired seta (fig. 4b). Exopod 3-jointed, 1st and 2nd each with a strong outer edge spine, the 3rd joint with 3 outer edge spines and one apical spine. 2nd and 3rd exopodal joints each with one inner edge seta. External margins of the exopodal joints set with fine, spiniform hairs. Endopod 2-jointed, the 1st with a single inner edge seta, the 2nd with a fine outer edge seta and two much stronger apical setae.

3rd leg almost as the 2nd (fig. 3a). The 2nd basal joint is scarcely produced at the external border and carries a fine hair. 1st exopodal joint with the indication of an inner edge seta. End spine of the 3rd exopodal joint strong. 1st endopodal joint haired; 2nd endopodal joint with 4 setae.

4th leg composed of two basal joints and two rami (fig. 3b). Basal joints small, the 2nd with a distinct, external prolongation, carrying a fine seta. Exopod 2-jointed, the 1st joint with a single setiform outer edge spine. In the dissected specimen the distal exopodal joint carries 6 spiniform setae, 2 of which are found along the external border, one along the internal border and 3 are placed more or less apical. In this respect there is some difference from Sars' figure, in which 5 setae are drawn on the distal joint. The setae are separated by slight incisions. Both exopodal joints have fine spinulose hairs. Endopod composed of a single, slightly haired joint, carrying two apical spiniform setae.

The 5th leg consists of a basal plate, carrying a single joint (fig. 4 c). Both basal portions of left and right 5th legs are separated by a considerable distance. Internal portion of basal lamella with some (4-5) strong hairs, external margin with distinct prolongation, carrying a fine hair. The joint is more or less triangular and elongated. In the dissected specimen there are 4 subapical spiniform setae; the external border carries a row of rather strong hairs. Internal margin finely ciliated. No armature of the genital flaps has been observed. No eggs are present.

Synonymy. *Harrietella simulans* was first described by T. Scott after some female specimens obtained from the valves of a dead *Cyprina* (Lamelli-branchia), dredged in the Firth of Forth. Afterwards numerous females were obtained from crevices in logs of partly decayed wood, brought up by the trawl in the Firth of Clyde. A single female was found by Sars in the bottom residue of a collecting bottle, in which material collected at Drøbak (Oslofjord) had been preserved. Scott's females carried 2 egg globules —

the Laophontids normally have a single egg ball — and apparently reproduction was in full swing. Sars' specimen carried no eggs. The present specimens are attached to the telson of *Limnoria lignorum* — in some instances also to the legs or oral parts — by means of the powerful maxillipeds and the endopod of the 1st legs. Stephensen (1936) describes a male Laophontid from *Limnoria* as *Laophonte brevifurca* (?); a comparison of the drawing shows that he certainly studied the male of *Harrietella simulans*, which sex has not been described by either Scott or Sars. Stephensen's only specimen measured 0.40 mm, the female of *Laophonte brevifurca*, according to Sars, measures 0.70 mm. The description and the drawings of the appendages of *Laophonte brevifurca* (?) in Stephensen's paper agree in many details with Sars' figures and with the present specimens (the 2nd antenna, maxilliped and 1st-4th legs). Stephensen has not figured the basal portions of the 3rd and 4th legs and he apparently overlooked the characteristic structure of the basal joints of these legs, but he figures the 2nd basal joint of the 2nd pair with a prominent outer edge seta. There are, of course, differences in the structure of the 1st antenna, endopod of the 3rd leg, and the 5th legs, due to difference in sex. The 5th leg in the male consists of a single joint, not unlike that found in the female, carrying 4 marginal setae. The genital flap is armed on both sides with a rather strong spine. The rostral projection is described by Stephensen as "rather short".

The presence of some developmental stages on *Limnoria* makes it probable that the animal, at least after the metamorphosis of the nauplius into the copepodid, attaches itself to the Isopod and, for some time, lives there as a commensal. Both sexes have now been found attached to *Limnoria* and it seems reasonable to suppose that the female, when hatching the eggs, either moves freely about, or remains in the holes excavated by *Limnoria*. The last supposition seems the more likely, as *Harrietella simulans* has so far not been observed in plankton samples, collected either at the surface or near the bottom.

After the preceding lines were written I received Dr. Nicholls' review of the families Diosaccidae and Laophontidae (Nicholls, 1941). In his paper (p. 98) Nicholls already refers Stephensen's *Laophonte brevifurca* to the genus *Harrietella*, a supposition which now seems beyond doubt. The genus *Harrietella* may be defined as follows:

Laophontidae with a pyriform, much flattened body, greatest diameter in the middle of the anterior division. Female: 1st antenna 6-jointed, 2nd antenna with distinct, unsegmented exopod, carrying 4 setae. 2nd maxilla with 3 well defined lobes. Endopod of the 1st leg 2-jointed, distal segment with claw, exopod 3-jointed. 2nd and 3rd legs with 3-jointed exopod and

2-jointed endopod. 4th leg with 2-jointed exopod and 1-jointed endopod. 5th leg composed of a simple, lamelliform segment attached to a basal portion. 2nd basal joint of 2nd, 4th and 5th legs with external prolongation, carrying a seta. Genital flap not armed.

Male: 1st antenna modified. Endopod of 3rd leg and the 5th leg modified; exopods of the 2nd to 4th legs as in the female. Genital flap (in genotype) armed with a spine.

Genotype: *Laophonte simulans* T. Scott, 1894.

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