

Observations on the Common Horse Bot (*Gasterophilus intestinalis*) (Diptera: Gasterophilidae): Incomplete Molting of a Second Instar Specimen

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ABSTRACT

Description and illustration are given of a specimen of the third instar of the common horse bot (*Gasterophilus intestinalis*) with the cast-off cuticle of the second instar attached at 2 places. It was recovered from the stomach of a dead 4-month-old horse along with 1 second instar *G. intestinalis* on 14 August 1991.

Horse bots are ubiquitous parasitic insects. There are 2 main species, the common horse bot (*Gasterophilus intestinalis*) and the throat bot (*Gasterophilus nasalis*), in equids in the U.S.A. Bots spend the bulk of their life span inside these animals as larvae (1st, 2nd, and 3rd instars). The primary location in equids is the stomach for the common bot and duodenum for the throat bot (1).

The life cycle is similar for all species of bots. Bot flies lay eggs on the hairs of equids (Fig. 1)—mainly on the forelegs for *G. intestinalis* and lower jaws for *G. nasalis*. After at least 1 week of incubation, 1st stage larvae hatch from the eggs in response to licking by the equid (*G. intestinalis*) (Fig. 2) or spontaneously (*G. nasalis*); shortly thereafter, they enter the mouth.

Larvae spend about 1 month in the tissues of the mouth undergoing development, and then are swallowed as 2nd instars (Fig. 2). The final molt to 3rd instars occurs after an additional month (Fig. 2). After a maximum of about 10 months in the equid, bot fly larvae pass as 3rd instars in the feces, pupate, and the adult flies emerge in a few weeks.

During an examination of the stomach of a dead 4-month-old horse (mixed lighthorse) suckling on 14 August 1991, two specimens of *G. intestinalis* were found. One was a 2nd instar. The other, a 3rd instar with the cuticle of the 2nd instar partially attached. The latter specimen is described because thousands of horse bots have been examined over several years by the present authors, but this type of occurrence has not been observed previously (E. T. Lyons, University of Kentucky, pers. comm.).

Morphological features of the present specimen are illustrated (Figs. 3, 4, and 5) and include the following: The cuticle of the 2nd instar is attached by structures (probably parts of the respiratory system) at 2 locations to the 3rd instar: (1) a few strands of tissue connect the spiracular plates of the 2nd instar cuticle to the area of 1 spiracular plate of the 3rd instar, and (2) a tubular structure is attached laterally to the 11th segment of the 2nd instar cuticle and last row of spines of the 3rd instar.

The cuticle of the 2nd instar is turned inside out except at the anterior end. There is a linear opening in the ventral midline, extending between segments 1 and 9 (through segments 2 and 8, inclusive). The cuticle is folded over on the edges of the opening. Between segment 1 and approximately the 3rd and 4th segments, the opening appears to be dorsal. However, in this area, the cuticle is not turned inside out. Apparently, the anterior end was reinverted with the normal side out during emergence of the 3rd instar; or, it never was turned inside out.

On the inside of the cuticle of the 2nd instar are several strands that are attached at one end; the other end is free. Exact nature of these remnants of the 2nd instar is uncertain, but it is likely that they are nonfunctional spiracular filaments (2). It has been suggested that the attachment of the internal tracheae to the nonfunctional spiracles is important to the process of the removal of the ecdysed 2nd instar tracheal system (2). The respiratory system of *G. intestinalis* first instars in metapneustic and second and third instars is amphipneustic (3).

The morphological details of the 2nd instar cuticle and its attachment to the 3rd instar

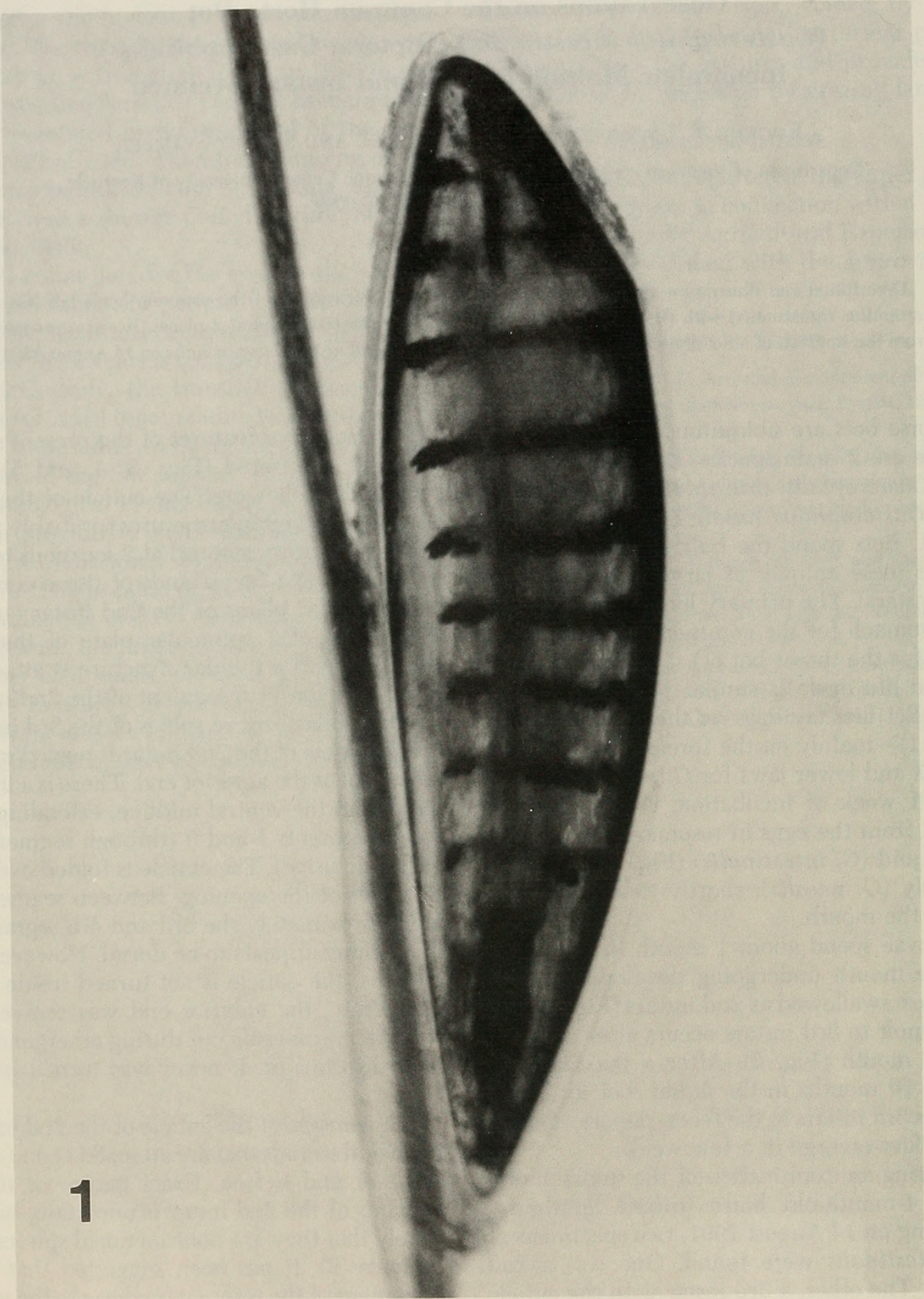


FIG. 1. *Gasterophilus intestinalis* from a horse: egg containing 1st instar and attached to a hair from the leg (20×).

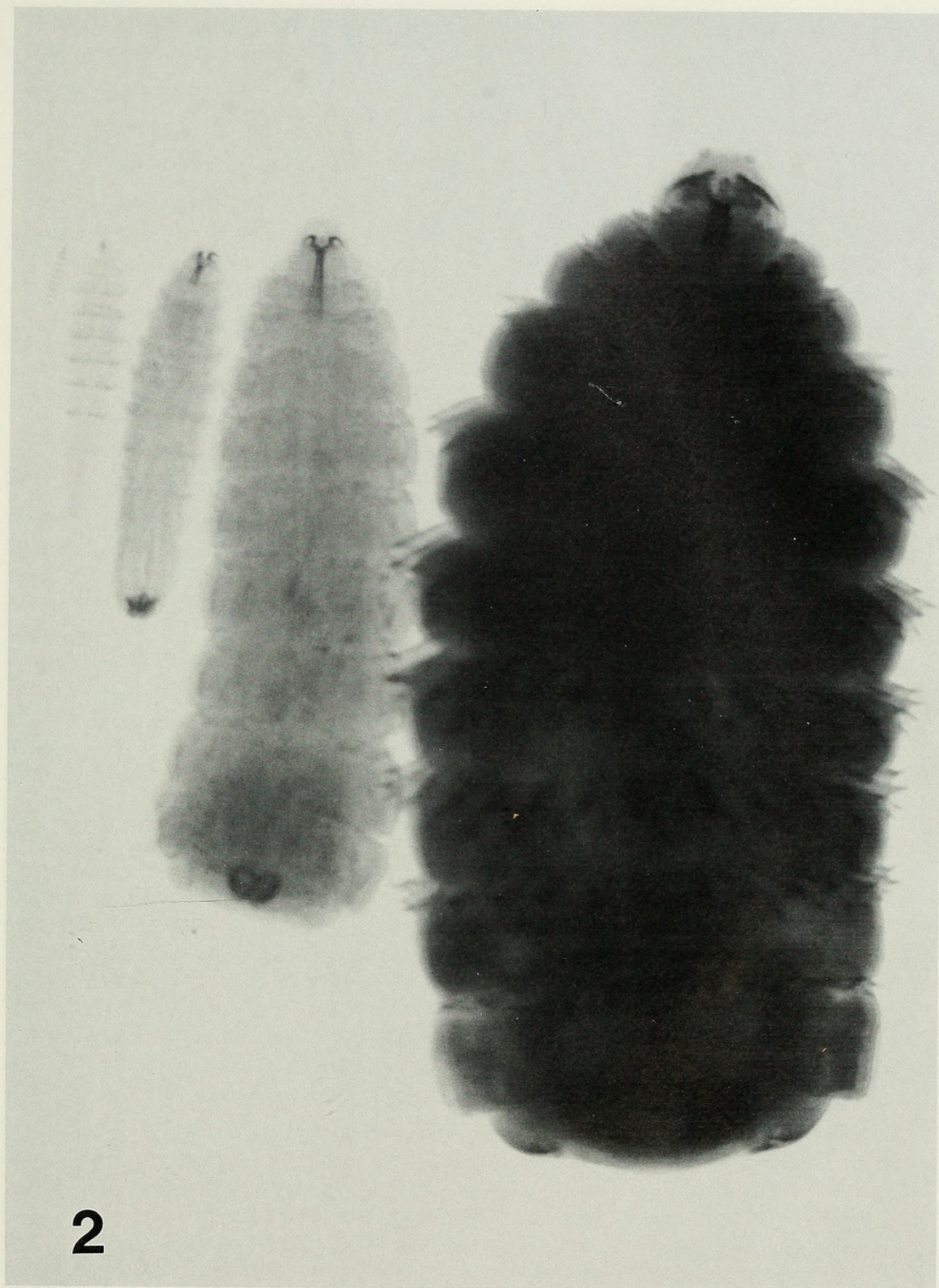


FIG. 2. *Gasterophilus intestinalis* from a horse: 1st, 2nd, and 3rd instars (ventral side). Left to right—1st instar from an egg and from the mouth, 2nd instar from lesion around the teeth and from the stomach, and 3rd instar from the stomach (7.5 $\times$).



FIG. 3. Whole specimen of *Gasterophilus intestinalis*, 3rd instar (dorsal view) and cuticle of 2nd instar turned partially inside out (7.5 $\times$). Strands, probably part of the respiratory system, are evident (see arrow).

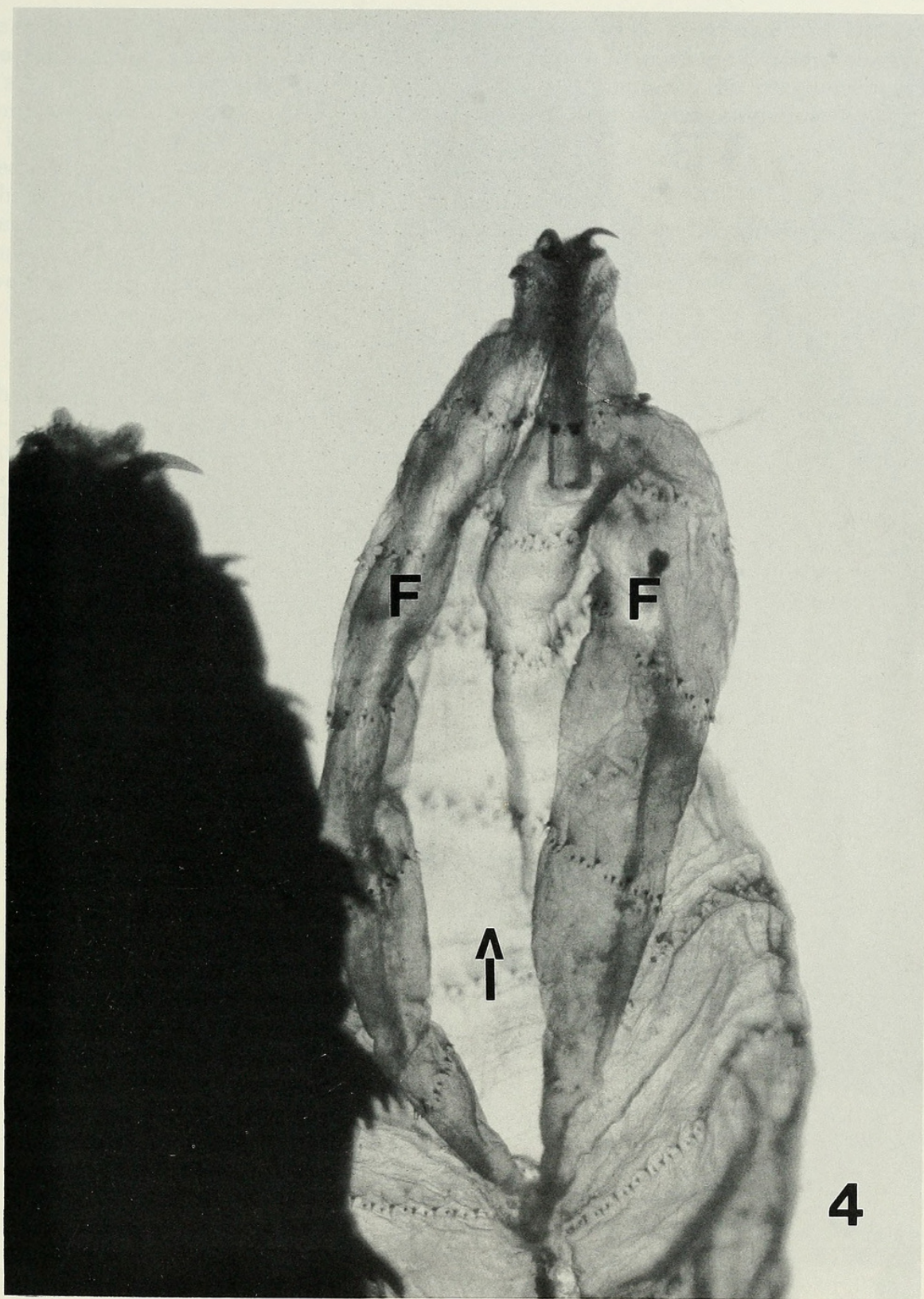


FIG. 4. Anterior end of *Gasterophilus intestinalis*, 3rd instar (partial) (dorsal view) and cuticle of 2nd instar (view is ventral except extreme anterior end is dorsal) (20 $\times$). The linear opening (arrow) of the 2nd instar cuticle where the 3rd instar emerged and the folds (F) are obvious.

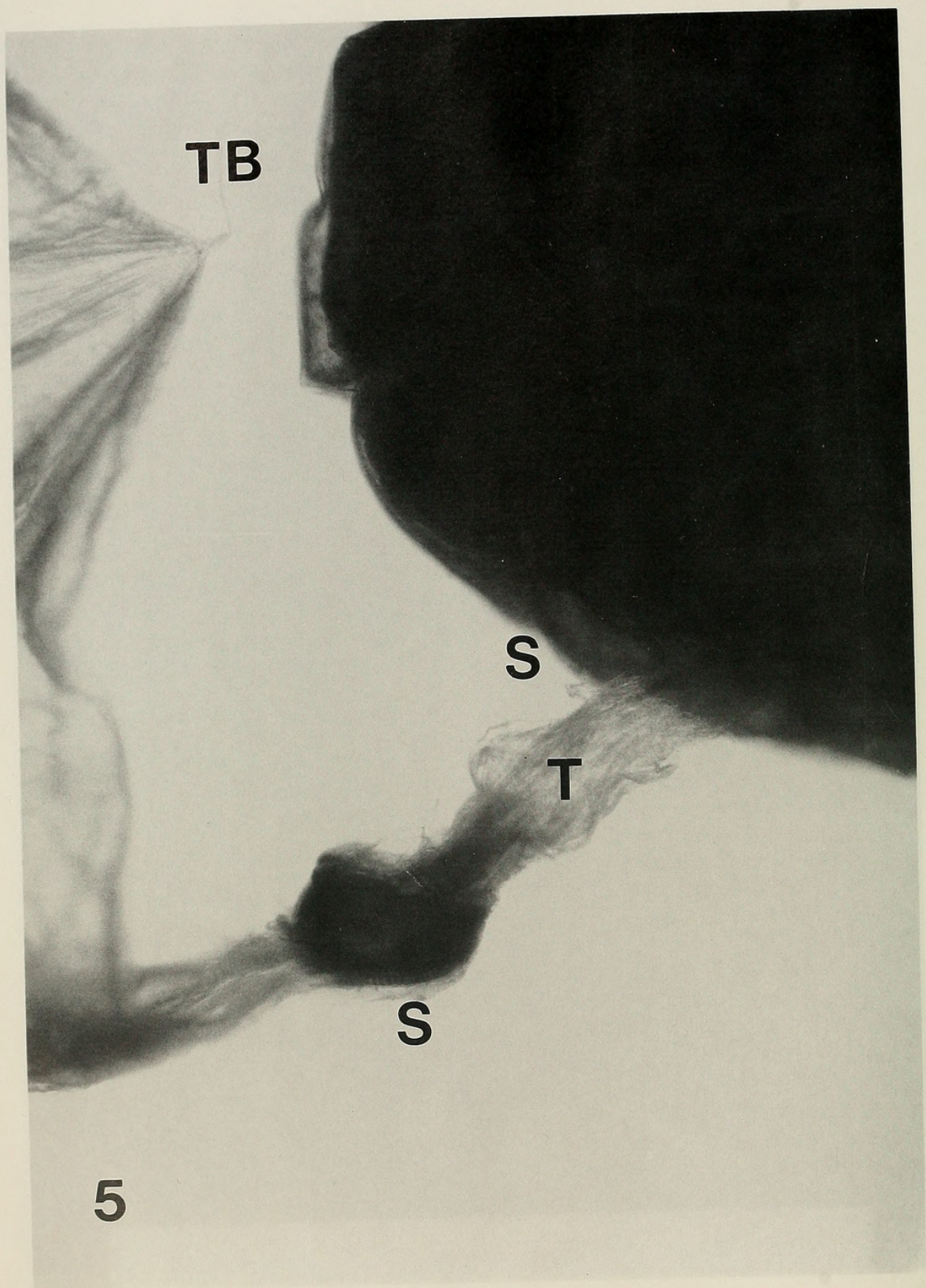


FIG. 5. Posterior ends (partial) of *Gasterophilus intestinalis*, 3rd instar (ventral view) and cuticle of 2nd instar (40 $\times$). Note: 2 attachment sites of cuticle of 2nd instar (left) to 3rd instar (right)—tags (T) of tissue connecting spiracles (S) of both instars and a tubular structure (TB).

have been described for the specimen *in situ*. It is unknown whether the 3rd instar was found just at the end of a normal ecdysis, or some abnormality existed so that separation of the 2nd instar cuticle would not have been completed even after a longer period of time.

The 3rd instar appeared normal. It is assumed that the manner of escape of this stage through the 2nd instar cuticle was typical. However, the failure to completely separate may be atypical.

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