Taxonomic Status of *Berntsenus brachycephalus* (Nematoda: Aphelenchina)

T. R. Kaisa

Abstract: *Berntsenus brachycephalus* is redescribed from original material collected by Thorne in Utah, and hololectotype and paralectotypes are designated. This species is characterized by an expanded lip region, offset head, heavily sclerotized stylet conus, and two rows of oogonia and spermatogonia. The hololectotype male is 720 µm long, and paralectotype males are 864 to 952 µm long. Paralectotype females are 840 µm long. Tails of both sexes are amuconrate.

Key words: Aphelenchina, *Berntsenus brachycephalus*, hololectotype, nematode, paralectotype, taxonomy.

There is uncertainty about the status of a species originally described by Thorne (1935) in the genus *Aphelenchoides*. *Aphelenchoides brachycephalus* was initially transferred to the genus *Laimaphelenchus* by Massey (1956), and then to the genus *Ekaphelenchus* by Goodey (1960). Finally, Massey (1974) transferred it to the genus *Berntsenus* and designated it as the type species for the genus. Later, Baujard (1984) synonymized *E. tenuidens* (Thorne, 1935) Ru¨hm, 1956 with *B. brachycephalus*. This synonymy was accepted by Ebsary (1991) but rejected by Hunt (1993).

Because of the continuing uncertainty regarding the status of this species, it is herein redescribed from material originally collected by Thorne, and hololectotype and paralectotypes are designated.

**Materials and Methods**

*Berntsenus brachycephalus* material was obtained from the Thorne Collection in the U.S. Department of Agriculture Nematode Collection (USDANC), Beltsville, Maryland. This included material used by Thorne (1935) to describe this species and by Massey (1974) to describe the genus *Berntsenus*. The majority of the material comprised specimens collected by Thorne in 1932, 1933, and 1935 from three localities in Utah (Horse Creek, Blacks Fork, and Provo Basin), and the remainder comprised specimens collected by Thorne in 1933 from Spring Canyon, Utah (Fig. 1). Measurements were taken from glycerin-mounted specimens. Spicule length and body ratios were calculated following Hooper (1986). If specimens were flattened, corrected body diameters were calculated following Geraert’s second formula (1961).
Systematics

Berntsenus brachycephalus (Thorne, 1935) Massey, 1974
  syn. Aphelenchoïdes brachycephalus Thorne, 1935
  syn. Laimaphelenchus brachycephalus (Thorne, 1935)
  Massey, 1956
  syn. Ektaphelenchus brachycephalus (Thorne, 1935)
  Goodey, 1960
  (Figs. 2A–J)

Description

Male: Measurements of hololectotype and paralectotype males are given in Table 1. Body J-shaped, 720 to 952 µm long. Tail curved to conoid, amucronate terminus (Figs. 2B and 2D). Cuticle with fine, transverse striae. Incisures not observed. Head distinctly offset, lip region expanded. Stylet 20 to 21 µm long; conus 8 to 10 µm long, heavily sclerotized. Posterior portion of stylet difficult to distinguish; knobs appear to be absent. Pro-

corpus 36 to 45 µm. Median bulb 22 µm long by 15.4 to 16 µm wide, valves centrally situated. Excretory pore indistinct in all specimens. Nerve ring 90 to 104 µm from anterior end. Testis not reflexed, at times reaching gland lobes. Spermatogonia in two rows. Spicules 18 to 20 µm long; apex and rostrum weakly developed. Two pairs of caudal papillae present: first pair adcloacal, second pair pre-anal. Bursa and gubernaculum absent.

Female: Measurements of paralectotype females are given in Table 1. Body 840 µm long, tapering posteriorly to conoid, amucronate tail (Figs. 2E and 2G). Tail 38 to 42 µm long. Stylet 16 to 18 µm long, otherwise same as male. Procorpus 32 to 40 µm long. Median bulb 20 to 22 µm long by 14 µm wide. Excretory pore visible in one specimen, 101 µm from anterior end. Nerve ring 83 to 90 µm from anterior end. Intestine terminating in rectum and anus. Ovary single, outstretched; spermatheca indistinct. Oogonia in two rows. Postuterine sac present, 90 to 108 µm long. Vulva posteriorly located (V=75–76), lips protuberant or not protuberant; flap absent. Vaginal transverse or slightly oblique.

Type habitat and locality

Associated with mountain pine beetle (Dendroctonus ponderosae Hopk.) on lodgepole pine (Pinus contorta Douglas), Provo Basin, Utah, and also from bark beetle frass, Horse Creek, Utah.

Type specimens

Hololectotype male and one paralectotype male collected by G. Thorne on 25 June 1935 on slide no. T-5101p, and two paralectotype females collected on 25 June 1935 on slide no. T-5102p, also in USDANC.

Diagnosis

Berntsenus brachycephalus is distinguished by an expanded lip region, offset head, two rows of oogonia and spermatogonia, and a heavily sclerotized stylet conus.

Relationships

A longer female body (840 µm vs. 652–736 µm), tail (38–42 µm vs. 26–34 µm), postuterine sac (90–108 µm vs. 80–90 µm), and larger c’ ratio (3.2–4.2 vs. 2.8) distinguish B. brachycephalus from the only other species in the genus, B. labiosus Massey, 1974.

Remarks

In this study, stylet knobs were not observed in either B. brachycephalus or B. labiosus. This is contrary to observations by Thorne (1935) and Massey (1974), who included these structures in the original drawings of these species. Perhaps knobs become transparent over time and are not observable in old specimens. This might explain why Massey used the lack of knobs in B. brachycephalus as one criterion for differentiating these species.

Measurements of specimens from the different localities sampled by Thorne generally corresponded well to those given in descriptions by Thorne (1935) and Massey (1974) (Tables 1 and 2). Some males from Provo Basin and Blacks Fork, Utah were shorter than originally reported by Thorne (720–786 µm vs. 800–1,000 µm); however, these measurements are within the 7% to 9% shrinkage range that is expected for old glycerin-mounted specimens (Esser, 1974). Although this species was listed as E. brachycephalus by Ebsary (1991) and
Table 2. Measurements of different populations of *Berntsenus brachycephalus* (Thorne, 1935) Massey, 1974 from Utah (this study), from Thorne’s 1935 description, and from Massey’s 1974 description.

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<tr>
<td></td>
<td>Females (<em>n=2</em>)</td>
<td>Males (<em>n=4</em>)</td>
<td>Males (<em>n=4</em>)</td>
<td>Females (<em>n=7</em>)</td>
<td>Males (<em>n=7</em>)</td>
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<td>Linear (µm)</td>
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<tr>
<td>Body length</td>
<td>912 (802–962)</td>
<td>806 (743–900)</td>
<td>827 (786–890)</td>
<td>900 (800–1000)</td>
<td>900 (800–1000)</td>
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<td>Greatest width</td>
<td>28.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>35.3 (34–36.3)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28.7 (24.9–32.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>30.1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30.1&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Procorpus length</td>
<td>31 (29–33)</td>
<td>33.8 (31–38)</td>
<td>33.8 (31–38)</td>
<td>28.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>28.6&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Metacorpus length</td>
<td>-</td>
<td>22.5 (19–26)</td>
<td>22 (20–24)</td>
<td>15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Metacorpus width</td>
<td>17.4 (16.4–18.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21.7 (20.3–23)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17.4 (15.4–19.3)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Stylet length</td>
<td>18 (17–19)</td>
<td>17.8 (16–21)</td>
<td>18.8 (16–22)</td>
<td>19.5 (17.3–21.7)</td>
<td>19.5 (17.3–21.7)</td>
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<td>Tail length</td>
<td>41</td>
<td>34.8 (31–36)</td>
<td>40 (36–42)</td>
<td>39.2 (34.8–43.5)</td>
<td>33.8 (30–37.5)</td>
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<td>Anal body width</td>
<td>11.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>21.4 (17.9–22.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>18.3 (17–20.7)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>12.2 (108–13.5)</td>
<td>18.2 (16.2–20.3)</td>
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<td>Spicule length</td>
<td>-</td>
<td>19.8 (18–22)</td>
<td>20.8 (20–22)</td>
<td>-</td>
<td>22.6&lt;sup&gt;b&lt;/sup&gt;</td>
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<tr>
<td>Postuterine sac</td>
<td>118&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>108 (96–120)</td>
<td>-</td>
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<td>Ratios</td>
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<td>a</td>
<td>31.8 (30–33.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.9 (20.5–26.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.1 (24.2–33.5)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>33.3 (26.7–41.7)</td>
<td>35.7 (28.6–44.6)</td>
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<td>b</td>
<td>10.3 (9.8–10.7)</td>
<td>9.5 (8–10.6)</td>
<td>8.9 (8.6–9.1)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>8.5 6.0–10.4</td>
<td>9.1 (7.5–11.4)</td>
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<td>b’</td>
<td>5.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5 (4.6–5.4)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-</td>
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<td>c’</td>
<td>3.6&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.6 (1.6–1.7)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-</td>
<td>2.2 (2–2.5)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.5 (2.8–4.4)</td>
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<td>V or T</td>
<td>76.5 (75–78)</td>
<td>-</td>
<td>62.8 (58.2–67.2)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>76</td>
<td>25</td>
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<sup>a</sup> Value corrected for flattened specimens following Geraert’s second formula (1961).
<sup>b</sup> Calculated from figures.
<sup>c</sup> Character not observable.
<sup>d</sup> Value obtained from one specimen.
<sup>e</sup> Value obtained from two specimens.
<sup>f</sup> Flattened specimens.
synonymized with *E. tenuidens* by Baujard (1984), the presence of an anus excludes it from *Ektaphelenchus* and the expanded lip region and distinctive stylet differentiate it from *E. tenuidens*.

**Literature Cited**


