

Notes on the morphometric characters of *Ponera coarctata* (Hymenoptera, Formicidae)

Yilmaz CAMLITEPE

Department of Biology, Faculty of Arts & Sciences, University of Trakya, 22030 Edirne, Turkey; tel.: +90 284 2120928, fax: +90 284 2120927, e-mail: yilmazc@trakya.edu.tr

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The measurements given by Taylor in his monographic revision of the genus *Ponera*, suggest that *Ponera coarctata* (Latreille, 1802) workers are more than twice as large as queens. This conflicts with anecdotal observations of several authors. Therefore the standard measurements and indices of both workers and queens of *Ponera coarctata* collected from various sites within the European part of Turkey in the Thrace region, Britain, France and Spain were investigated. Queens were, as expected, larger than the workers, indicating that Taylor's data are probably a result of miscalculation.

Key words: Formicidae, Ponerinae, *Ponera coarctata*, morphometric characters.

Introduction

The species of the genus *Ponera* (Hymenoptera, Formicidae, Ponerinae) are small, slow-moving hypogaeic ants. They are mainly carnivorous, feeding on small arthropods, and can be easily distinguished by a subpetiolar process with a translucent thin spot near the front and a sharp angle or pair of small teeth near the rear as well as by two segmented maxillary palps.

The genus contains 37 living species from North America, and Europe to Japan, Samoa and Australia (BOLTON, 1995; TERAYAMA, 1996).

In his invaluable monographic revision of the genus *Ponera*, TAYLOR (1967) presented taxonomic standard measurements and indices of *P. coarctata* (Latreille, 1802) on the basis of 11 queens (Italy, France and England) and several hundred workers collected from most parts of the species' range. In the monograph, the standard

measurements and indices of queens are significantly lower than those of workers, with each measurable character of the former being half that of the latter. However, these data are not convincing as queens are generally larger than workers. Thus, interpretation of Taylor's data is ambiguous and no reports appear to have been reported in the literature concerning this problem. The present study was carried out to clarify this.

Material and methods

The material examined in this study came from a collection held in the Biology Department of Trakya University (Edirne, Turkey). In addition, several British, French and Spanish specimens were supplied by C. A. Collingwood. A total of 28 workers and 6 queens were studied. All samples were collected during three years (1985–1987) from various sites within the European part of Turkey in the Thrace region.

Table 1. Morphometric data of individual workers of *Ponera coarctata*.

Sites	TR1	TR2	TR3	TR4	TR5	TR6	EN1	EN2	FR1	SP1	SP2	Range of samples (n = 28)
No. of samples	10	1	1	1	4	4	1	1	2	1	2	
HL	0.76;0.76;0.78;0.78;0.78; 0.78;0.78;0.78;0.80;0.80	0.78	0.74	0.78	0.74;0.74; 0.74;0.76	0.76;0.80; 0.80;0.80	0.76	0.76	0.78;0.80	0.74	0.70;0.70	0.70-0.80
HW	0.52;0.52;0.56;0.56;0.56; 0.56;0.58;0.58;0.58;0.58	0.56	0.54	0.58	0.56;0.56; 0.56;0.58	0.56;0.58; 0.58;0.58	0.58	0.58	0.54;0.54	0.48	0.50;0.48	0.48-0.58
SL	0.56;0.56;0.56;0.56;0.56; 0.58;0.58;0.58;0.58;0.58	0.54	0.52	0.56	0.52;0.56; 0.56;0.56	0.58;0.58; 0.58;0.58	0.52	0.50	0.54;0.56	0.52	0.48;0.50	0.48-0.58
CI	66.6;68.4;71.7;71.7;71.7; 72.5;72.5;73.6;74.3;74.3	71.7	72.9	74.3	75.6;75.6; 75.6;76.3	70.0;72.5; 72.5;76.3	76.3	71.0	69.2;67.5	64.8	71.4;68.5	64.8-76.3
SI	96.5;100;100;100;100; 100;103.5;103.5;107.6;107.6	96.4	96.2	96.5	92.8;96.5; 100;100	100;100; 100;103.5	86.2	96.2	100;103.7	108.3	96.0;104	86.2-108.3
PW	0.46;0.46;0.46;0.48;0.48; 0.48;0.48;0.48;0.48;0.48	0.48	0.44	0.48	0.44;0.44; 0.44;0.46	0.48;0.48; 0.48;0.48	0.48	0.48	0.48;0.48	0.44	0.42;0.42	0.42-0.50
PNL	0.22;0.22;0.22;0.24;0.24; 0.24;0.24;0.24;0.24;0.24	0.24	0.24	0.24	0.22;0.22; 0.22;0.24	0.22;0.22; 0.24;0.24	0.24	0.24	0.24;0.24	0.22	0.22;0.22	0.22-0.24
PH	0.48;0.48;0.48;0.48;0.48; 0.48;0.48;0.48;0.50;0.50	0.48	0.42	0.42	0.42;0.44; 0.44;0.44	0.48;0.48; 0.48;0.50	0.48	0.48	0.46;0.46	0.40	0.40;0.42	0.40-0.50
DPW	0.34;0.34;0.34;0.36;0.36; 0.36;0.36;0.36;0.36;0.36	0.36	0.36	0.36	0.32;0.32; 0.34;0.34	0.36;0.36; 0.38;0.38	0.36	0.36	0.36	0.34	0.32	0.32-0.38
PNI	70.8;73.9;73.9;75.0;75.0; 75.0;75.0;75.0;75.0;78.2	75.0	81.8	75.0	72.7;72.7; 73.9;77.2	75.0;75.0; 79.1;79.1	75.0	72.0	75.0	77.2	76.1	72.0-81.8

Key: All metric values are expressed in mm. TR - Turkey, TR1 - Demirkoy (40°00' N, 30°01' E); TR2 - Erikligoller (37°51' N, 27°37' E); TR3 - Kocagol (40°09' N, 27°50' E); TR4 - Sivriiler (41°47' N, 27°51' E); TR5 - Vize (41°34' N, 27°45' E); TR6 - Saray (41°26' N, 27°55' E); TR7 - Edirne (41°40' N, 26°34' E); EN - England, EN1 = Herts (51°45' N, 00°20' W); EN2 = Brean Down (51°20' N, 03°02' W); FR - France, FR1 = Fontainebleau (48°24' N, 02°42' E); SP - Spain, SP1 = Santander, provincia de (43°10' N, 04°00' W); SP2 = Rojals (41°20' N, 01°07' E).

Table 2. Morphometric data of individual queens of *Ponera coarctata*.

Sites	TR1	TR4	TR7	EN1	Range of samples (n = 6)
No. of samples	1	3	1	1	
HL	0.84	0.82;0.84;0.86	0.82	0.78	0.78–0.84
HW	0.56	0.58;0.58;0.60	0.58	0.54	0.54–0.60
SL	0.62	0.64;0.66;0.66	0.62	0.52	0.52–0.66
CI	66.6	69.0;69.7;70.7	70.7	69.2	66.6–70.7
SI	110.7	106.6;113.7;113.7	106.8	96.2	96.2–113.7
PW	0.58	0.62;0.64;0.64	0.58	0.56	0.56–0.64
PNL	0.24	0.24;0.24;0.24	0.24	0.24	0.24–0.24
PH	0.52	0.54;0.56;0.56	0.52	0.52	0.52–0.56
DPW	0.40	0.44;0.44;0.44	0.40	0.38	0.38–0.44
PNI	68.9	68.7;68.7;70.9	68.9	67.8	67.8–70.9
MDE	0.20	0.18;0.20;0.20	0.20	0.16	0.16–0.20

For key see Table 1.

The same measurements as TAYLOR (1967) were made, specifically:

head length (HL) = maximum head length in full face view, from the midpoint of the occipital border to the most anterior point on the anterior clypeal border;

head width (HW) = maximum head width in full face view, excluding eyes (worker and female);

scape length (SL) = maximum scape length excluding its articulation condyle;

cephalic index (CI) = $(HW \times 100)/HL$;

scape index (SI) = $(SL \times 100)/HW$;

pronotum width (PW) = maximum pronotum width from directly above, measured at right angles to the long axis of mesosoma;

petiolar node length (PNL) = with petiolar segment viewed exactly from the side; the distance from the midpoints of the curves where the anterior and posterior faces of the node meet its anterior and posterior peduncles;

petiole height (PH) = maximum measurable petiole height in lateral view, from summit of the node to the extreme lowermost part of the subpetiolar process;

dorsal petiol width (DPW) = maximum width of the petiolar node in dorsal view, measured at right angles to the body axis;

petiolar node index (PNI) = $(DPW \times 100)/PW$;

MDE = maximum diameter of the compound eye (female only).

Results and discussion

The standard measurements and indices taken from each sample of workers and queens are presented in Tables 1 and 2, respectively. The results demonstrate significant similarities in the morphometric characters of workers between samples. However, the standard measurements of Spanish worker samples, particularly SP2, are slightly

lower than the remaining samples (Tab. 1). TAYLOR's (1967) *Ponera coarctata* samples from the Mediterranean sites also tended to be slightly smaller than those from more northern areas. Taylor (p. 25) stated that these small specimens from the Mediterranean areas tend to yield higher SI and PNI and lower CI values than large specimens. Our results indicate that no such correlation exists, but there is a large overlap in the ranges of SI, PNI and CI values, irrespective of body size (Tab. 1). Furthermore, Turkish samples, having greater standard values and thus being larger, have slightly higher SI and PNI values and significantly lower CI values (Tabs 1, 3), thereby contradicting Taylor's results.

Overall, the ranges of the morphometric data for worker samples in this study are consistent with Taylor, with the exception of lower CI and higher SI values.

Taylor's measurements and indices of the *P. coarctata* queen are significantly lower than those given here (Tab. 3). It is unlikely that our queen samples form different population taxonomically since the standard measurements and indices of the worker samples are in broad agreement with those of TAYLOR (1967) (Tab. 3).

Furthermore my measurements are supported by COLLINGWOOD (1979) who noted that the total body length (TBL) of the *P. coarctata* worker is 3.0–3.5 mm, whereas the queen is 4.0–4.5 mm. ATANASSOV & DLUSSKY (1992), BONDROIT (1918) and KUTTER (1977) reported that TBL of the worker is 2.7–3.5 mm, but the queen is 3.6–4.2 mm. Similarly, STITZ (1939) stated that TBL of the worker is 2.5–3 mm whereas the queen is 3–4.5 mm.

Table 3. Comparison of the ranges of the morphometric data of workers and queens of *Ponera coarctata*.

Workers	Queens			
	Data 1 (range)	Data 2 (range)	Data 1 (range)	Data 2 (range)
HL	0.70–0.80	0.67–0.77	0.78–0.84	0.34–0.38
HW	0.48–0.58	0.50–0.60	0.54–0.60	0.28–0.32
SL	0.48–0.58	0.47–0.57	0.52–0.66	0.23–0.29
CI	64.8–76.3	77.0–82.0	66.6–70.7	85.0–88.0
SI	86.2–108.3	87.0–98.0	96.2–113.7	84.0–86.0
PW	0.42–0.48	0.39–0.46	0.56–0.64	0.23–0.27
PNL	0.22–0.24	0.22–0.25	0.24–0.24	0.11–0.13
PH	0.40–0.50	0.38–0.48	0.52–0.56	0.21–0.24
DPW	0.32–0.38	0.29–0.38	0.38–0.44	0.16–0.20
PNI	72.0–81.8	67.0–82.0	67.8–70.9	63.0–66.0
MDE			0.16–0.20	0.07–0.10

Key: All metric values are expressed in mm. Data 1 – the data presented in this study; Data 2 – the data given by TAYLOR (1967).

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