Bradysia difformis Frey and *Bradysia ocellaris* (Comstock): Two Additional Neotropical Species of Black Fungus Gnats (Diptera: Sciaridae) of Economic Importance: A Redescription and Review

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ABSTRACT The first records for Brazil of two sciarid species, *Bradysia difformis* Frey, 1948 [= *paupera* (Tuomikoski, 1960)] and *Bradysia ocellaris* (Comstock, 1882) [= *tritici* (Coquillett, 1895)] (Diptera, Sciaridae) are presented. These are the first records of these species for the Neotropical region. Males and females of both species are fully described and illustrated. Information is given about synonymy and the location of the type material. *Bradysia agrestis* Sasakawa, 1978 is a new synonym of *Bradysia difformis*. Information about the zoogeographic distribution and habitats, of *Bradysia difformis* and *Bradysia ocellaris* is provided.

KEY WORDS Diptera, sciaridae, *Bradysia difformis* Frey, *Bradysia ocellaris* (Comstock), descriptions, new synonym, new records, mushroom pests

THE DIPTEROUS FAMILY SCIARIDAE (Black Fungus Gnats) is found on every continent and is characterized by its high number of species and individuals. According to a species inventory by Menzel and Mohrig (2000), >1,700 valid species have been described in the world. Despite their ecological importance, these micro-Diptera have largely been neglected because of their small body size (1–7 mm), their often cryptic mode of life and the difficulties involved with their identification.

The larvae of the Black Fungus Gnats live in rotting organic matter (humus) in the soil, under the bark of decaying trees, on the mycelium or in the fruiting bodies of fungi, or they mine in the stems and leaves of herbaceous plants. A sample of 1 m^2 of substrate can produce up to 2,600 larvae in soil from open countryside and 200,000 larvae of a single species in mushroom compost (Deleporte and Rouland 1991). Plant roots have commonly produced larval densities of 20–80 individuals per plant and the stems from 220 to 830 individuals (Gerbachevskaja 1963). Under optimal conditions, there can be up to nine generations in the year—more in protected environments such as glasshouses or mushroom tunnels (Osmola 1970). Mass occurrences are not uncommon and can cause extensive damage in forestry and agriculture, leading to significant losses in crop production (Menzel and Mohrig 2000).

Some species belonging to *Bradysia* Winnertz, 1867 s. l. [species group of the *Bradysia amoena* (Winnertz, 1867) species group], and *Lycoriella* Frey, 1948 s. str. are common pests in mushroom cultures and in glasshouses (Binns 1976; Menzel and Mohrig 2000; White et al. 1996, 2000). In Europe, *Bradysia difformis* Frey, 1948 and *Bradysia ocellaris* (Comstock, 1882) are common and serious economic pests of glasshouse crops, but are less commonly found in association with the cultivation of the mushroom *Agaricus bisporus* Lange (Imbach) (Agaricaceae), in which two *Lycoriella* species [*L. castanescens* (Lengersdorf, 1940) and *L. ingenua* (Dufour, 1839)] are the main problem. However, the specimens described in this work were collected from a mushroom farm in Brazil, in which there was a serious sciarid infestation, but the mushroom being cultivated was *Agaricus blazei* Murr.

In addition to observations about the area and cultivation practices on the farm in which the flies were found, the two species of sciarid are redescribed and illustrated in this study, and a detailed literature review is provided.

Materials and Methods

Bradysia difformis and *Bradysia ocellaris* are named according to the new nomenclature and systematics by Menzel and Mohrig (2000) and are new records for the Neotropics. The descriptions given in this study are based on an examination of 418 specimens from

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many localities in the Afrotropical, Australasian, Palaearctic, Nearctic, Neotropical and Oriental regions. Of these, 313 were *Bradysia difformis* and 105 *Bradysia ocellaris.*

In addition, 30 type specimens were reassessed, and of these 21 were identified as *Bradysia difformis* and 9 as *Bradysia ocellaris.* These included the type specimens of *Bradysia agrestis* Sasakawa (7 males and 1 female), *Bradysia tristicula* variety *difformis* Frey (1 male), *Bradysia paupera* Tuomikoski (12 males), *Lycoria prothalliorum* De Meijere (5 males and 2 females) and *Bradysia rubicundula* Frey (2 males). Information about the synonyms is given in the discussion of each species. The following abbreviations are used for the museums in which the type specimens and other material are located:

BPBM, B. P. Bishop Museum, Honolulu, HI (material from Thailand; loan via Dr. N. L. Evenhuis).

CUIC, Cornell University, Department of Entomology, Ithaca, NY, U.S.A. (type material of *Sciara ocellaris* from United States; loan and information via Prof. Dr. J. Liebherr and Prof. Dr. W. Mohrig).

DEI, Deutsches Entomologisches Institut, ZALF e.V., Eberswalde, Germany (including private collection F. Menzel; material from Australia, Brazil, Europe, Indonesia, Japan, Taiwan, and Zimbabwe).

HRI, Horticulture Research International, Wellesbourne, Warwick, England, U.K. (material from Brazil, Europe, and Indonesia).

KPUK, Faculty of Agriculture, Laboratory of Entomology, Kyoto Prefectural University, Kyoto, Japan (type material of *B. agrestis* from Japan; loan via Prof. Dr. M. Sasakawa).

PWMG, private collection W. Mohrig, Greifswald, Germany (material from Australia, Ecuador, Europe, United States, and Zimbabwe; loan via Prof. Dr. W. Mohrig).

SMTD, Staatliches Museum für Tierkunde, Dresden, Germany (material from Europe; loan via U. Kallweit).

UZMH, Finnish Museum of Natural History, University of Helsinki, Finland (type material of *B. paupera*, *Bradysia rubicundula*, and *Bradysia tristicula* var. *difformis* from Finland; loan via Dr. P. Vilkamaa).

ZFMK, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany (material from Europe; loan via Dr. H. Ulrich).

ZMAN, Instituut voor Systematiek en Populatiebiologie, Zoölogisch Museum, Universiteit van Amsterdam, The Netherlands (type material of *Lycoria prothalliorum* from The Netherlands; loan via B. Brugge).

Adults were prepared following the method described by Menzel and Mohrig (2000). For scientific examination, permanent slides were first made using Canada balsam as the mountant. Examination of the flies and illustration of the morphological structures were done using a light microscope with a magnification of up to 1,875 times.

Observations

The sciarid infestation was found in a cultivated mushroom crop (*Agaricus blazei*) in Botucatu, São Paulo State, Brazil, during February and March 2000. Botucatu is 400 km from the coast and lies on latitude 22° 51′S and longitude 48° 26′W, is situated on low-lying hills at an average height of 786 m above sea level, and has an average annual temperature of 17°C. According to the Csa-Köppen classification (Triantafyllou and Tsonis 1994), the area is in a humid, temperate zone and is generally windy.

A. blazei is commonly known in Brazil as the Cogumelo-do-sol, Cogumelo-da-vida, or JUN-17, and abroad as the sun mushroom or Brazilian mushroom. The crop was grown in plastic boxes about 30 cm × 60 cm × 25 cm (w × l × h) in a converted ship container. Compost production was similar to that used for growing *A. bisporus*, with two composting phases, the second being a pasteurization phase. The compost composition was 45% Coast-cross straw [cultivar *Cynodon dactylon* (L.) Pers. (Poaceae), a grass used for cattle feed in Brazil and the United States], 40% sugar cane bagasse, 3% gypsum, 10% soybean bran (small fragments of the grains) and 2% urea and ammonium sulfate. Pasteurized Brazilian peat was used for the casing layer (Braga et al. 1998).

The average temperature in the growing chambers was 25°C (range, 19–28°C) with a relative humidity of 70% during the production phase. The concentration of carbon dioxide in the air was maintained at 200 ppm during cropping. Before casing, the compost was colonized completely with mushroom mycelium, was sweet smelling, and there were no signs of larvae. However, the spawn-running period was longer than usual because of technical problems.

Throughout the cropping period, electric fly traps caught thousands of adult flies, and larvae were found in the compost. The larvae reached such high numbers that the compost became badly contaminated with larval frass and started to smell unpleasant. In parts, the mushroom mycelium was either totally destroyed by the larvae or was unable to recolonize the contaminated compost. Consequently, there was a high crop loss and some of the fruit bodies were found to be infested with fly larvae. A sample of the flies was collected and preserved in 70% alcohol. Two species of *Bradysia* were found in the sample, *B. difformis* and *B. ocellaris.* The majority of the flies within the sample were found to be *B. difformis* (91 examples), and only four specimens were identified as *B. ocellaris.* This is the first record of these species being found in Brazil and on the cultivated mushroom, *A. blazei.*

Notes on the Species

***Bradysia difformis* Frey, 1948** (Figs. 1–10)

Type Material. LECTOTYPE (male) in UZMH collection [designated by Menzel (Menzel and Mohrig 2000)].

Synonyms. *Bradysia paupera* Tuomikoski, 1960 [LECTOTYPE and PARALECTOTYPES in UZMH

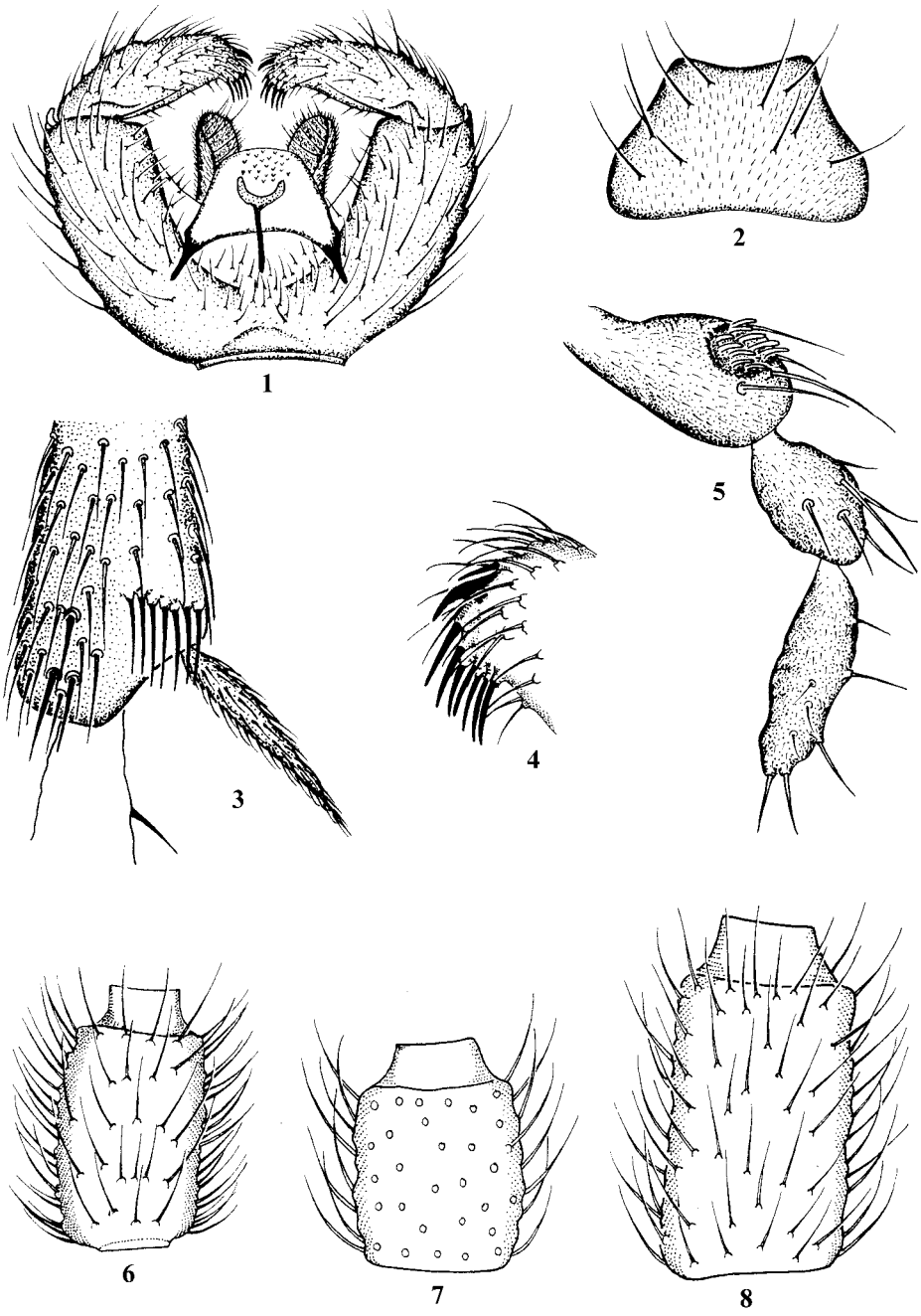

Fig. 1–8. *B. difformis* Frey. (1) Hypopygium, male, ventral view. (2) Tergite IX, male. (3) Apex of fore tibia, male. (4) Apical part of gonostyle, male, ventral view. (5) Palpus, female. (6–8) Fourth flagellomere: (6) male from Japan, (7) male from Brazil, (8) female from Brazil.

collection; designated by Menzel (Kühne et al. 1994), synonymized by Menzel and Mohrig (Menzel and Mohrig 2000)]; *Bradysia agrestis* Sasakawa, 1978, new synonym [HOLOTYPE and PARATYPES in KPUK collection; examined by Menzel and Mohrig (Menzel and Mohrig 2000)].

Distribution. Nearctic, UNITED STATES (new record), New York; Ithaca. Neotropical, BRAZIL (new record), São Paulo State, Botucatu. Palaearctic, AZERBAIJAN; CZECH REPUBLIC, Košice; FINLAND, Helsinki, Kasvitiet, Puurarua; GERMANY, Ahlum by Wolfenbüttel, Aschersleben, Bansin, Baut-

zen, Berlin, Bonn, Braunschweig-Völkenrode, Bremen, Eberswalde, Geisenheim, Göttingen, Greifswald, Halle (Saale), Hannover, Jena, Joachimsthal, Kiel, Kleinmachnow, Kühlenhagen, Leipzig, Neudorf near Bautzen, Osnabrück, Schwanebeck, Schwanewede, Ulm, Waldhütte near Bayreuth; GREAT BRITAIN, Cheshire, Bridgemere Nurseries; Devon, Exeter; Essex, Nazeing; Hertfordshire, Lea Valley Farm; Warwickshire, Leamington, Wellesbourne; Worcestershire, Evesham; ITALY, Padova, Pisa, Massa Carrara; JAPAN, Honshû, Anjyo, Kyoto, Osaka; LATVIA, Riga; RUSSIA, North European territory; SPAIN (new record), Prov. Pontevedra, Lourizán-Pontevedra; SWITZERLAND, Genf; THE NETHERLANDS, Noord-Brabant, Udenhout.

Habitats. Approximately 80% of the prepared specimens examined had been found in glasshouses, laboratories, fields, and mushroom houses (*A. bisporus* and *A. blazei*). The larvae were found on the stems and roots of young plants (*Saintpaulia*, *Antirrhinum* spp, beans, *Schlumbergera*, carnations, chrysanthemums, pelargonia, cucumbers, cyclamen, freesias, geraniums, hydrangea, lettuce, lilies, lucerne, lupins, maize, melon, peas, poinsettia, potatoes, strawberries, sugarbeet). The remaining 20% had been caught on ruderal land, in deciduous (beech, copper beech, oak) or coniferous (pine, spruce) woods. The species has also been found on moorland (on peat moss) and in gardens (on ornamental plants).

Literature. *Bradysia aprica* (Winnertz) [misidentification] in Santini and Lucchi 1994, 15 (pest of protected crops); Carcupino and Lucchi 1995, 109 (morphology of eggs). *Bradysia paupera* Tuomikoski in Tuomikoski 1960, 130 and 134 (description and identification); Poinar and Doncaster 1965, 73 (biological control); Gerbachevskaja 1969, 349 (identification); Hudson 1974, 85 (biological control); Hudson 1975, 455 (biological control); Binns 1981a, 415 (biology); Binns 1981b, 79 (biology); Freeman 1983, 36 (identification); Hövemeyer 1985, 78 (biology and ecology); Krivosheina and Mohrig 1986, 155 (faunistics); Calvert 1987, 39 (larval extraction); Dorn 1987, 80 (ecology); Rudzinski 1989, 30 (ecology); Menzel et al. 1990, 364 (faunistics and distribution); Rudzinski 1992, 430 (faunistics and ecology); Buxton 1993, 23 (biological control); Menzel and Mohrig 1993, 61 (faunistics); Weber 1993, 66 (biology and ecology); Albert 1994, 3 (biological control); Kühne et al. 1994, 34 (redescription, culture, and biological control); Rudzinski 1994, 467 (ecology); Wessel 1990, 80 (culture); Kühne and Müller 1995, 16 (culture); Weber and Prescher 1995, 45 (ecology); Mohrig 1996, 95 (faunistics); Franzen et al. 1997, 311 (ecology); Alford 1999, 167 (agricultural entomology). *Bradysia agrestis* Sasakawa in Sasakawa and Akamatsu 1978, 27 (description and glasshouse pest); Menzel and Mohrig 2000, 146 (redescription and taxonomy). *B. tristicula* var. *differmis* Frey in Frey 1948, 61 (description); Tuomikoski 1960, 137 (taxonomy). *Bradysia differmis* Frey in Menzel and Mohrig 2000, 152 (nomenclature and taxonomy); White et al. 2000, 207 (mushroom pest).

Redescription: Male. Eye bridge 2–3 facets wide. Antenna short, compressed, and uniformly dark; basal flagellomeres (scape and pedicel) dark brown; fourth flagellomere (Figs. 6 and 7) 1.2–1.7 times as long as wide and with slightly roughened surface; the hairs on the flagellomeres curved and erect, hairs one-half to two-thirds as long as the segment width; necks short, uniformly dark brown, and distinct. Prefrons and clypeus with strong, dark bristles. Palpus moderately long, three segmented and yellow to light brown; basal segment with 3–7 bristles (1–2 obviously longer than the others) and with a darker, distinctly edged and deep sensory pit; sensillae blunt, long, and slightly curved; last segment 1.3–1.5 times as long as the short, oval second segment; basal segment compact, slightly thickened and club shaped, and about as long as the last segment. Body hairs strong, coarse and black. Thorax and abdomen dark brown to black, with light brown to yellow areas laterally. Coxae and femora light brown to whitish-yellow; tibiae and tarsi blackened because of the thick, dark bristles. Postpronotum bare. Mesonotum with strong, dark ground setulae and long, lateral bristles. Katepisternum short and triangular, not elongated. Scutellum with three long, strong bristles among the finer ground setulae. Inner side of fore tibia (Fig. 3) with comblike row of 6–7 strong bristles. Mid and hind tibiae with two yellowish, thin and subequal spurs. Tarsal claws untoothed. Wing (Fig. 10) smoky gray-brown; posterior veins (all M and Cu) strong and, like wing membrane, without macrotrichia; stem of M rather longer than fork of M; fork of M short, compressed and wide apart; x = 0.7–1.0 y, both bare or end of y with one or two macrotrichia; stem of CuA 0.6–0.8 x; R_1 very short = 0.7 R and joining the costa well before base of fork of M; C = one-half w or only slightly longer. Halter brown with very short stalk. Hypopygium (Fig. 1) compact and almost as high as wide; ventral inner side without basal lobe or group of hairs; inner side of gonocoxites short, covered with dark hairs; hairs thicker and longer at most basally; Tergite IX (Fig. 2) short, trapezoid, slightly emarginate apically and edged with several long bristles. Gonostyle about 2.5 times as long as wide. Tip of gonostyle (Fig. 4) with thicker and coarser bristles, apex with distinct raised, thin, hooked tooth as well as 5–7 subequal curved spines directed ventromedially. Tegmen somewhat wider than high, slightly curved laterally, and flatly rounded apically. Tooth field obviously wider than high and with strong single-tipped teeth. Aedeagus moderately long, and with sclerotized base. Length 1.8–2.1 mm.

Female. Flagellomeres short; fourth flagellomere (Fig. 8) not obviously shorter than that of male, but at most 1.6–2.0 times as long as wide. Palpus (Fig. 5) three segmented; basal segment often with larger sensory pit. Wing (Fig. 9) larger and narrower; stem of M obviously longer than fork of M; C = two-thirds w. All other characteristics as in male. Length: 1.9–2.3 mm.

Discussion. *B. differmis* is easily recognized by the very short, compressed flagellomeres of the males, and on this basis cannot be confused with other *Bradysia*

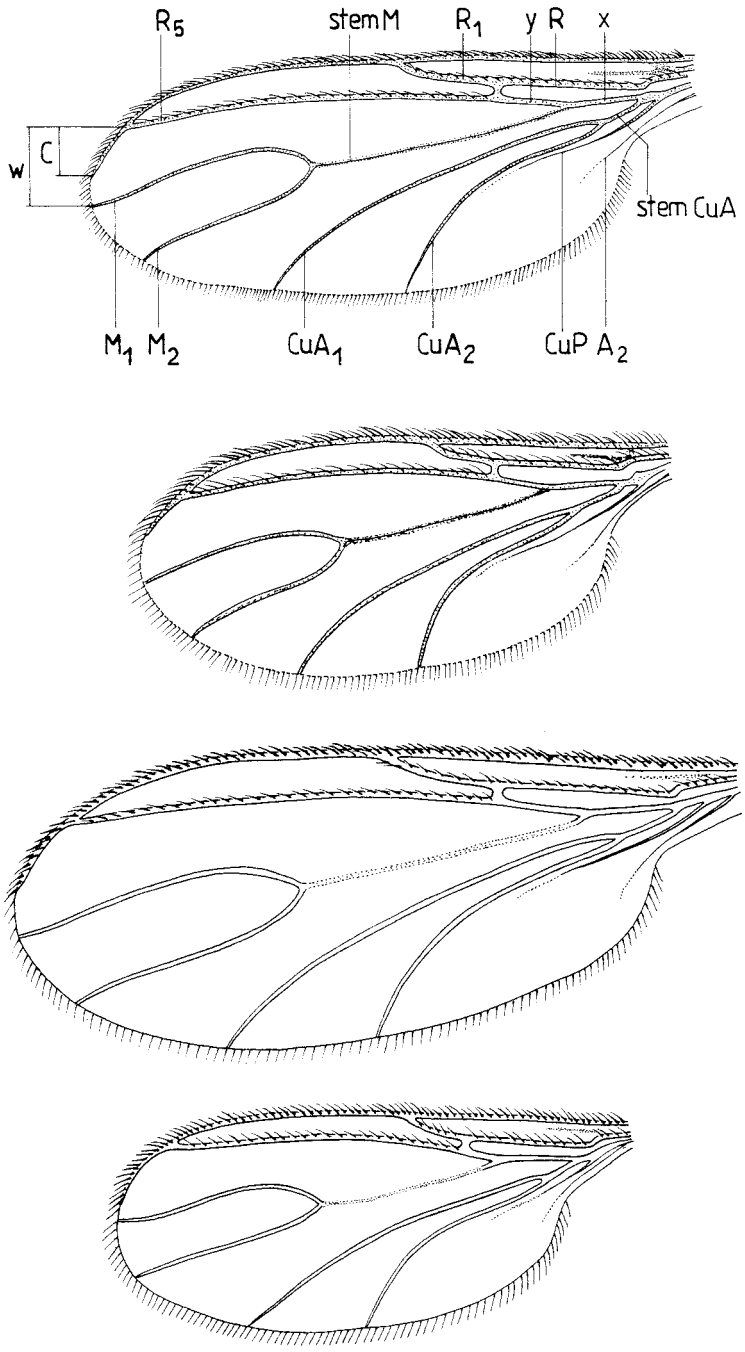

Fig. 9–12. Wings. (9) *B. difformis* Frey, female. (10) *B. difformis* Frey, male. (11) *B. ocellaris* (Comstock), female. (12) *B. ocellaris* (Comstock), male.

species with similar genitalia. This is the only species of the genus in which the males have shorter, or at most subequal, flagellomeres than do the females (Figs. 7 and 8). It differs from other species of the *B. amoena* group by the dark, rather than yellow, tip of the gonostyles and basal flagellomeres, as well as the presence of a thin tooth on the tip of the gonostyles and 5–7 subequal, distinctly curved, and subapical spines (Fig. 4).

Bradysia ocellaris **(Comstock, 1882)** (Figs. 11–22)

Type Material. SYNTYPES (four males, no. 849, 2115, and 2115.1) in CUIC collection. In the collection

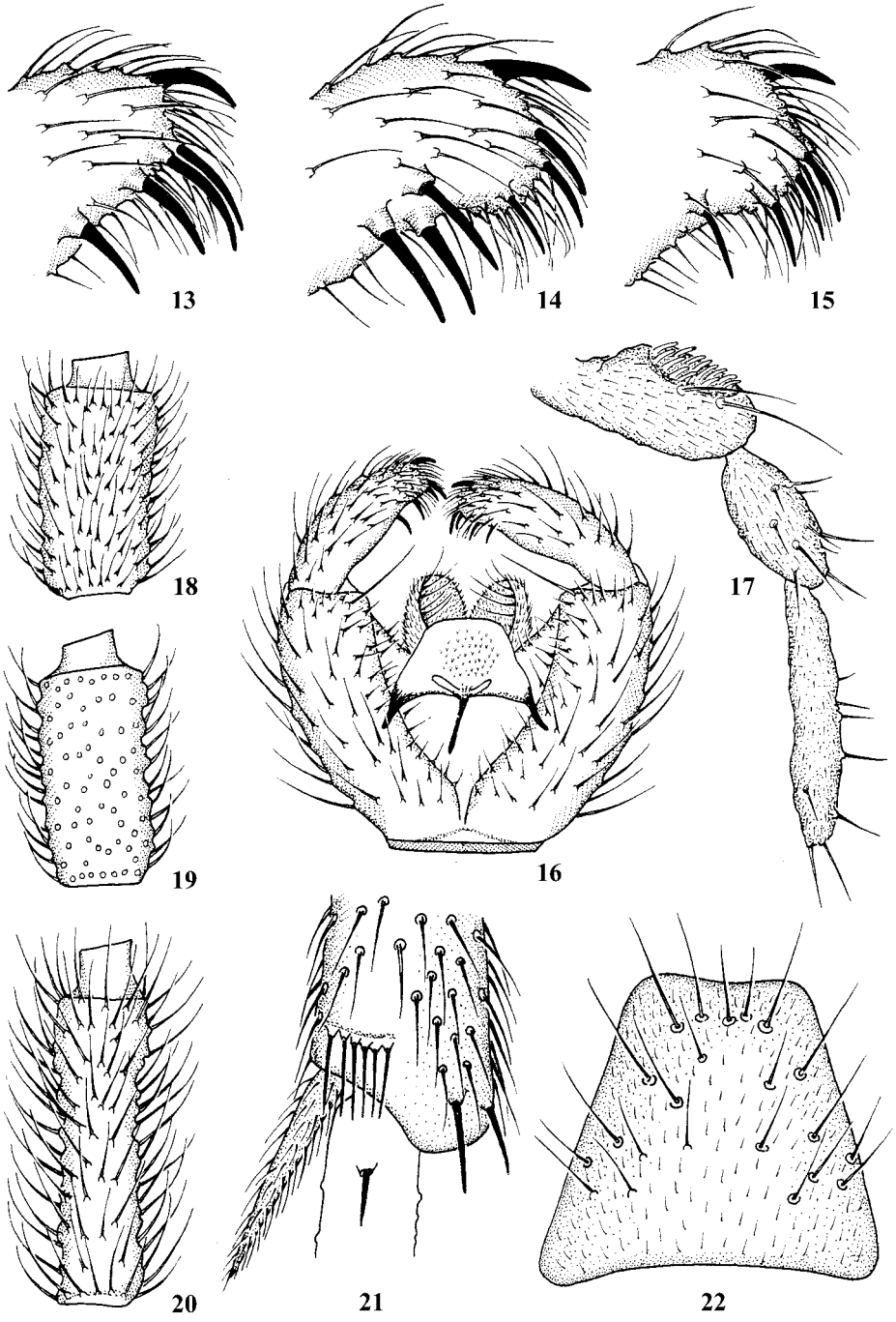

Fig. 13–22. *B. ocellaris* (Comstock). (13–15) Apical part of gonostyle, dorsal view: (13) male from Brazil, (14) male from Germany, (15) male from Zimbabwe. (16) Hypopygium, male, ventral view. (17) Palpus, female. (18–20) Fourth flagellomere: (18) male from Germany, (19) male from Brazil, (20) male from Australia. (21) Apex of fore tibia, male. (22) Tergite IX, male.

catalog, three further preparations were registered (no. 2115.2, 2115.3, and 2115.4). However, that additional material could not be found in the Cornell collection (verified Mohrig).

Synonyms. *Sciara tritici* Coquillett, 1895 [LECTOTYPE and PARALECTOTYPES in USNM collection; designated and synonymized by Steffan (Steffan 1965, 1974a)]; *Lycoria prothalliorum* De Meijere, 1946

(LECTOTYPE and PARALECTOTYPES in ZMAN collection; designated by Menzel, synonymized by Menzel and Mohrig (Menzel and Mohrig 2000)]; *Bradysia* (*Chaetosciara*) *rubicundula* Frey, 1948 [LECTOTYPE and PARALECTOTYPE in UZMH collection; designated by Menzel (Menzel and Mohrig 2000), synonymized by Tuomikoski (Tuomikoski 1960)]; *Sciara* (*Lycoriella*) *garretti* Shaw, 1952 [HOLOTYPE in USNM collection; synonymized by Steffan (Steffan 1965)]; *Sciara* (*Lycoriella*) *johannseni* Shaw, 1952 [HOLOTYPE in USNM collection; synonymized by Steffan (Steffan 1969)]; *Sciara* (*Lycoriella*) *laffooni* Shaw, 1952 [HOLOTYPE in USNM collection; synonymized by Steffan (Steffan 1969)].

Distribution. Afrotropical, ZIMBABWE (new record), Harare; Mashonaland West, Chinhoyi. Australian/Oceanian, AUSTRALIA (new record), North-East Queensland, Kuranda near Cairns; United States, Hawaiian Islands, Hawaii, Kauai, Laysan, Maui, Midway, Oahu; S. Mariana Islands, Guam; Ponape, Kolonia; Kusaie, Matanluk; Marshall Islands, Eniwetok. Nearctic, UNITED STATES, Alabama, Birmingham; Iowa, Ames; Louisiana, Orleans Co., New Orleans; Maryland, Prince George Co., Beltsville; New Jersey, New York (? imported from Chile); New York, Buffalo, Ithaca, Lancaster, Rochester; Virginia, Arlington Co., Arlington; ? District of Columbia, Washington DC. Neotropical, BRAZIL (new record), São Paulo State, Botucatu; ECUADOR (new record), Galapagos Islands; PANAMA (as Panama Canal Zone), Barro Colorado Island. Indomalayan, INDIA, Goara, Sagar Islands; INDONESIA (new record), Bandung; THAILAND (new record), Pakchong NE of Bangkok; TAIWAN, Daitotei, Taihoku, Taipei. Palaearctic, BULGARIA, Sofia, Viniza near Varna, Vitoscha mountains near Zelezniza; CHINA, Peking; FINLAND, Helsinki; Nyland, Helsinge; GERMANY, Eggersdorf near Strausberg, Falkenberg near Berlin, Greifswald, Schwanebeck near Bernau, Schwanewede, Ulm; GREAT BRITAIN, London; North Yorkshire; Surrey; West Midlands, Birmingham; Warwickshire, Warwick, Wellesbourne; IRELAND, Dublin; RUSSIA, Leningradskaya Oblast, Moscowskaya Oblast, Far East; SPAIN, Canary Islands, La Gomera; SWITZERLAND (new record), Genf; THE NETHERLANDS, Alphen aan de Rijn.

Habitats. The species was found in glasshouses, commercial mushroom houses [*A. blazei*, *Agaricus brunnescens* Peck, *Agaricus bitorquis* (Quél.) Sacc., *Pleurotus cystidiosus* Miller, *Pleurotus ostreatus* (Jacquin: Fries) Kummer, and *Auricularia* spp.], other dwellings, in gardens (on ornamental plants), in deciduous woods (acacia, lime, oak, red maple), and on stream banks (in reeds and moss). The larvae were found feeding on the roots and/or stems of campanula, carnations, corn, cucumbers, geraniums, lettuce, nasturtiums, young orchid plants, peas, pineapple, poinsettia, potato tubers, primula seedlings, sugar cane, wheat, and also in the soil around cactus plants. This species was also found in waste disposal facilities in Germany.

Literature. *Sciara pectoralis* Staeger sensu Edwards in Edwards 1925, 539 (taxonomy). *B.* (*Chaetosciara*) *rubicundula* Frey in Frey 1948, 64 and 82 (description). *Lycoria prothalliorum* De Meijere in De Meijere 1946, 5 (description and biology). *S. tritici* Coquillett in Coquillett 1895, 406 (description and agricultural pest); Johannsen 1912, 119 and 129 (identification and redescription); Edwards and Williams 1916, 259 (agricultural pest); Séguy 1961, 298 (faunistics). *Neosciara tritici* (Coquillett) in Pettey 1918, 322 (identification). *Lycoria* (*Neosciara*) *tritici* (Coquillett) in Lengersdorf 1928–30, 44 and 56 (identification and redescription). *Bradysia tritici* (Coquillett) in Steffan 1965, 290 (taxonomy); Steffan 1966, 22 and 23 (agricultural pests and cytogenetics); Steffan 1969, 715 and 723 (identification and redescription); Steffan 1973, 356 (literature); Steffan 1974a, 468 (redescription); Steffan 1974b, 45 (biology and ecology); Lin et al. 1977, 228 and 245 (biological control); Pavluchenko 1981, 68 (agricultural pests); Freeman 1983, 36 (identification); Gagné 1983, 705 (taxonomy); Pavluchenko 1984, 94 (agricultural pests); Alam et al. 1988, 485 (redescription); Menzel et al. 1990, 376 (faunistics and distribution); Menzel and Mohrig 1991, 21 (faunistics and distribution); O'Connor and Ashe 1991, 29 (faunistics); Dimitrova and Mohrig 1993, 96 (faunistics). *S.* (*Lycoriella*) *garretti* Shaw in Shaw 1952, 491 and 494 (description and identification). *Sciara (Lycoria) garretti* Shaw in Hardy 1960, 221 (identification, redescription, and taxonomy). *S.* (*Lycoriella*) *johannseni* Shaw in Shaw 1952, 491 and 493 (description and identification). *Sciara* (*Lycoriella*) *laffooni* Shaw in Shaw 1952, 491 and 494 (description and identification). *S. ocellaris* Comstock [nec *Cecidomyia ocellaris* Osten Sacken, 1862; = *Acericecis ocellaris* (Osten Sacken, 1862), verified Gagné (1983)] in Comstock 1882, 202 (description); Mik 1883, 190 (biology and identification); Johannsen 1912, 119 and 138 (identification and redescription); Metz 1938, 176 (morphology and variability); Rieffel and Crouse 1966, 233 (cytogenetics); Pavan and Da Cunha 1969, 432 and 437 (cytogenetics). *Neosciara ocellaris* (Comstock) in Ellisor 1934, 25 (biology and control); Binns 1981b, 85 (biology). *Bradysia ocellaris* (Comstock) in Tuomikoski 1960, 130 and 133 (identification and redescription); Gerbachevskaja 1963, 498 (agricultural pests); Nielsen and Nielsen 1979, 50 (biology and agricultural pests); Rudzinski 1994, 467 (faunistics); Menzel et al. 1997, 143 (faunistics and distribution); Mohrig et al. 1997, 384 (faunistics); Werner 1997, 48 (ecology); Menzel and Mohrig 2000, 155 (taxonomy).

Redescription: Male. Eye bridge 2–3 facets wide. Antenna long and with lighter basal segments; scape and pedicel seldom uniform brown, but often brighter whitish-yellow (then, usually, areas of first to third flagellomere also brightly colored); segments narrowing and becoming shorter toward tip; fourth flagellomere (Figs. 18 and 19) 2.2–2.5 times as long as wide and with rough surface; hairs on flagellomeres strongly curved and relatively close together, hairs light brown and about one-half as long as segment width (variability in specimens from Australia: flagellomeres dis-

tinctly longer and narrower, fourth flagellomere 3.5–4.0 times as long as wide, basal parts with scarred, rough surface, antennal hairs about as long as segment width and more erect [Fig. 20]); necks short, distinct, and bicolored (pale with dark smoky tip). Prefrons and clypeus with strong, dark bristles. Palpus moderately long, three segmented, and light brown; basal segment with 2–3 bristles (1 distinctly longer than remainder) and with darker, distinctly edged, and deep sensory pit; sensillae blunt, long, and slightly curved; last seg-ment long, 1.4–1.6 times as long as longish-oval segment 2; basal segment thin and shorter than apical segment. Body hairs strong, coarse, and dark brown (only rather sparser and finer in Brazilian specimens). Thorax and abdomen light to red brown, thorax laterally with yellow. Coxa and femora light brown to yellow; tibiae and tarsi blackened because of dark bristles. Postpronotum bare. Mesonotum with strong, dark ground setulae and long, lateral bristles. Katepisternum short, triangular, and not elongated. Scutellum with two long, strong, and two shorter, weaker, marginal bristles among ground setulae. Inner side of fore tibia (Fig. 21) with comblike row of 6–9 bristles (these about one-half as wide as tip of the tibia). Mid and hind tibiae with two yellowish, thin, and subequal spurs. Tarsal claws untoothed. Wing (Fig. 12) slightly brown; posterior veins (with exception of weakly developed bases of fork and stalk of M) strong and, like wing membrane, without macrotrichia; stem of M rather longer than fork of M; fork of M short compressed to longish-narrow and wide apart; x = 1.3–1.5 y, both bare; stem of Cu_1 0.6–0.8 x, R_1 very short = 0.5–0.7 R and joining costa well before base of fork of M; C = three-fourths w. Halter brown with short stalk. Hypopygium (Fig. 16) compact, almost as high as wide and mostly conspicuously yellow to reddish-brown; ventral inner side without basal lobe or group of hairs; inner side of gonocoxite with very short, fine, pale hairs; Tergite IX (Fig. 22) high trapezoid, about twice as high as apical width and slightly rounded apically; basal one-fourth of Tergite IX bare, and upper three-fourths set with long, sparsely arranged bristles. Gonostyle longish-narrow, 2.5–3.0 times as long as wide. Tip of gonostyle (Figs. 13–15) with thicker and coarser bristles, with distinctly raised, thin, hooked apical tooth; upper half of gonostyle on inner side slightly emarginate and with 4–6 strong spines (2 spines arranged as subapical pair with 2–4 spines together further down); all spines on gonostyle dark, subequal in length, and evenly curved ventromedially. Tegmen wider than high, membranous, and trapezoid; tip of tegmen flattened; tooth field coarse and with strong single-tipped teeth. Aedeagus moderately long, narrow and with weakly sclerotized base. Length: 2.0–2.5 mm.

Female. Flagellomeres shorter and distinctly narrower than in male; all segments (including scape and pedicel) dark brown; fourth flagellomere 1.7–3.5 times as long as wide; basal parts of flagellomeres almost smooth, with finer and paler hairs; necks almost as dark as the basal part and therefore not so strikingly bicolored as in male. Palpus three segmented (Fig. 17); basal segment with larger sensory pit and with larger number of sensilla. Bristle comb on fore tibia narrower, about one-third as wide as tibial tip. Wing (Fig. 11) larger and longer; x = 1.0–1.2 y; stem of CU_1 0.7 x; R_1 = 0.7–0.9 R and joins costa well before base of fork of M. All other characteristics as in male. Length: 2.7–3.0 mm.

Discussion

The species belongs to the *B. amoena* group on the basis of the combination of: basal segment of the palpus with a strong, deep sensory pit; mesonotum with strong lateral bristles; untoothed tarsal claws; ventral base of the genitalia without a basal lobe; inner side of gonocoxite without long bristles; hypopygium with longish, narrow gonostyles; tip of gonostyles densely bristled, with a claw-shaped short apical tooth and with subapical spines that reach at most to the middle of the gonostyles and tegmen membranous and trapezoid. The yellow-white base of the male antenna is very characteristic. The pale color is always found at least on the scape and pedicel, but the first two flagellomeres are also often yellow. *B. ocellaris* differs from all the other species in the *B. amoena* group by the characteristic arrangement of 4–6 strong spines on the upper third of the gonostyles. Only two of these spines are arranged as a pair at the inner angle of the tip of the gonostyle. The other spines (2–4) are somewhat isolated on the ventral inner side of the gonostyles (Figs. 13–15). This typical arrangement of the spines readily distinguishes this from other species.

Males from the Australian region differ in their antennal structure from males from other zoogeographic regions. They are characterized by longer and narrower flagellomeres (Fig. 20), which have longer hairs and a much higher length to width index. (fourth flagellomere = 3.5–4.0 times as long as wide). However, no other features could be found that might justify the recognition of a different species. The identical genital structure in all our specimens of *B. ocellaris* indicates an infraspecific variation that is also well known in the antennal structure of other widespread Palaearctic species of *Bradysia.*

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