Studies of Ephydrinae (Diptera: Ephydridae), IV: Revision of the Australian Species of Subgenus *Neoscatella* Malloch

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and
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SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 325

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Studies of Ephydrinae (Diptera: Ephydridae), IV: Revision of the Australian Species of Subgenus *Neoscatella* Malloch

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ABSTRACT

Mathis, Wayne N., and Willis W. Wirth. Studies of Ephydrinae (Diptera: Ephydridae), IV: Revision of the Australian Species of Subgenus *Neoscatella* Malloch. *Smithsonian Contributions to Zoology*, number 325, 27 pages, 46 figures, 1 table, 1981.—The Australian species of *Scatella*, subgenus *Neoscatella*, are revised. Keys to subgenera and species, illustrations, and distribution maps are provided. The subgenus *Neoscatella* is provisionally recognized, because its monophyly could not be established. A phylogeny is suggested for the Australian species, in which three species-groups are recognized. Nine Australian species are reported, of which six are described as new: *Scatella* (*Neoscatella*) *albilutea*, *S. austrina*, *S. bicolar*, *S. insularis*, *S. norrisi*, and *S. tasmaniae*. *Neoscatella victoria* Cresson is now included in the genus *Scatella* (new combination).

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Contents

Studies of Ephydrinae (Diptera: Ephydridae), IV: Revision of the Australian Species of Subgenus *Neoscatella* Malloch

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Introduction

Nearly half of the presently known species of Australian Ephydridae were described by J. R. Malloch (Lee, et al., 1956), and within the genus *Scatella* Robineau-Desvoidy, sensu lato, all but one of the Australian species were named by him (Malloch, 1925). E. T. Cresson, Jr. (1935) described the only other known species of Australian *Scatella*, *S. victoria* (Cresson). Since Malloch's work, numerous additional collections have been made, largely by D. Colless, and Z. Liepa, D. K. McAlpine, and W. W. Wirth (see "Acknowledgments"), and several new species have been discovered. Our purpose is to revise the Australian species of the subgenus *Neoscatella* Malloch of the genus *Scatella* as the first contribution to a series of publications on the Australian Ephydridae.

Methods and Materials.—During this study we examined nearly 500 specimens from the collections listed in "Acknowledgments." All types of nominate species were studied. Although we are describing six new species in this paper, others will undoubtedly be discovered when the more remote regions of Australia are thoroughly surveyed.

The general methods used in this study were explained in parts I, II, and III of this series (Mathis and Shewell, 1978; Mathis, 1979, 1980). Except for chaetotactic characters, we generally describe a feature from one side only.

Acknowledgments.—We are grateful to numerous persons for their cooperation and assistance during this study. We thank the following curators and institutions for loaning specimens (an asterisk indicates collections from which type specimens were borrowed):

AM	The Australian Museum, Sydney, Australia (Dr. David K. McAlpine)
ANIC	The Australian National Insect Collection, CSIRO, Division of Entomology, Canberra, Australia (Dr. D. H. Colless)
ANSP*	The Academy of Natural Sciences of Philadelphia, Philadelphia, USA (Dr. Daniel Otte)
SPHTM*	School of Public Health and Tropical Medicine, The University of Sydney, Australia (Dr. Margaret L. Cook)
USNM	former United States National Museum, collections in the National Museum of Natural History, Smithsonian Institution (collected almost exclusively by W. W. Wirth)

Wayne N. Mathis, Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D. C. 20560.
Willis W. Wirth, Systematic Entomology Laboratory, IIBIII, Science and Education Administration, USDA, c/o National Museum of Natural History, Washington, D.C. 20560.

Hollis B. Williams prepared all maps and organized locality data; Victor E. Krantz prepared the wing photographs; Molly Ryan, Michelle Wilcox, and Elaine R. Hodges executed the head and thorax illustrations; Elaine R. Hodges retouched some of the wing photographs; and Noreen M. Connell typed the final manuscript. A preliminary draft of this paper was reviewed by Donald M. Anderson, Amnon Freidberg, Raymond J. Gagne, and Ronald W. Hodges.

Genus *Scatella* Robineau-Desvoidy

Scatella Robineau-Desvoidy, 1830:801 [type-species: *Scatella buccata* Robineau-Desvoidy = *Scatella stagnalis* (Fallén), by subsequent designation (Coquillett, 1910:603].

DIAGNOSIS.—Specimens of *Scatella* are generally similar to those of *Parascatella* Cresson, but may be distinguished from the latter and other genera of Scatellini by the following combination of character states: mesofrons dull to shiny, if subshiny or shiny, contrasting distinctly with duller, more pollinose parafrons; 2 pairs of lateroclinate fronto-orbital bristles; inner and outer vertical bristles both well developed; paravertical bristles either reduced or absent; genal bristles generally well developed; acrostichal setae serried in 2 rows, frequently poorly developed or lacking posterior of transverse suture; 2–3 pairs of dorsocentral bristles (0 + 2; 1 + 1; 1 + 2); 1–2 pairs of humeral setae, frequently quite small, hairlike; supra-alar bristle either lacking or reduced, if evident, smaller than postalar bristle; wing variously developed, micropterous to macropterous, generally with pattern of white areas against infuscated brownish black background, infuscation sometimes faintly developed; surstylus either appearing to be absent (probably fused indistinguishably to ventral margin of epandrium) or evident as fused epandrial lobes, generally setose; aedeagal apodeme attached to aedeagus only, attachment to hypandrium lost, conformation dorsoventrally flattened and frequently L-shaped, angle sometimes quite obtuse; gonite with ventral and anterior projection, anterior projections from each side united anteriorly to form a loop through which the aedeagus can project, ventral projections generally acutely corniform.

DISCUSSION.—We have followed Sturtevant and Wheeler (1954) and Mathis (1980) in treating *Neoscatella* as a subgenus of *Scatella*, but we have doubts as to its status at this level also. To clarify its status, it will be necessary to revise the world's species to determine whether the species form a monophyletic lineage or each species (or species-group) of "*Neoscatella*" is more closely related to species of *Scatella*, sensu stricto.

In Australia, two subgenera of *Scatella* occur: *Scatella*, sensu stricto, and *Neoscatella*. The following key will distinguish them.

Key to Australian Subgenera of *Scatella*

Two pairs of large dorsocentral bristles (0 + 2), anterior bristle postsutural ..... ***Scatella***, sensu stricto, Robineau-Desvoidy

Three pairs of large dorsocentral bristles (1 + 2), anterior bristle presutural ..... ***Neoscatella*** Malloch

Subgenus *Neoscatella* Malloch

Neoscatella Malloch, 1933:9 [type-species: *Neoscatella atra* Malloch, by original designation and monotypy].

Scatella (*Neoscatella*).—Sturtevant and Wheeler, 1954:174.

DIAGNOSIS.—Specimens of *Neoscatella* are generally similar to those of *Scatella*, sensu stricto, but may be distinguished from the latter and other subgenera of *Scatella* by the following combination of character states: frons nearly flat, frontoorbit and ocellar triangle very slightly raised in relief from mesofrons; mesofrons generally subshiny, at least partially so, sometimes completely pollinose, appearing dull; second antennal segment with large dorsal seta not more than one-

half length of arista; face with interfoveal carina only moderately well developed, dorsal crease present but not conspicuously evident, sometimes subexplanate; antennal fovea shallowly impressed; marginal facial setae larger than anteromedian ones, but not stout; eye subspherical to broadly elliptical, bare; gena about one-fourth to one-third eye height; mesonotum moderately arched to arched; acrostichal setae seriated into 2 rows, generally not extending posteriorly past level of transverse suture, a bristle-like pair at level of transverse suture well developed; 3 pairs of dorsocentral bristles (1 + 2); humeral callus nearly bare except for 1-2 smaller setae; scutellum as long as wide, bare dorsally, with 2 pairs of lateral bristles; wing macropterous to stenopterous, if macropterous, with pattern of white spots against infuscated background; legs normal, femora not unusually turgid.

Discussion.—*Neoscatella* now includes about 30 described species, whose composite distribution comprises most of the world except for the Oriental, eastern Palearctic, and Antarctic regions. Approximately one-third of the known species were described from islands of the Pacific (Wirth, 1948).

Apparently, all of the known Australian species of *Neoscatella* are endemic, with the possible exception of *Scatella vittithorax*, which is also reported to occur in New Zealand (Harrison, 1959). We have not confirmed the latter, however.

With one partial exception, all of the known Australian species of *Neoscatella* occur in maritime habitats, such as sand dunes, beaches, and estuaries. The exception is *Scatella immaculata*, whose distribution extends mostly inland (Figure 26) but also ranges along the coast of southern New South Wales. Specimens of several species were captured in light traps in these habitats.

The male terminalia of the Australian species of *Neoscatella* are apparently a type not seen elsewhere. The surstyli are fused indistinguishably to the ventral margin of the epandrium and appear as two pointed median processes. We have found no significant differences in the structure of the Australian species, except for *Scatella immaculata*, but the number, size, and color of the setae between the species-groups are distinctive characteristics. In specimens of the *bicolor* group, the setae are few, small, and pale, appearing inconspicuous, but in the *austrina* group, the setae are numerous, large, and generally dark.

Phylogeny.—No apotypic character state common to all species of *Neoscatella* has been discovered; thus its monophyly is not established, and it could be paraphyletic. Moreover, we are not entirely convinced that the Australian species, as an assemblage of the subgenus, were derived from a single lineage, although there is some weak evidence that they are a monophyletic group. This state of affairs will continue until a thorough revision of *Scatella* on a world basis is made. With these reservations and their inherent assumptions, we suggest that the phylogeny of the Australian species is as diagrammed in Figure 1, based on the character evidence listed in Table 1.

We have recognized three species-groups: the *bicolor* group, the *immaculata* group, and the *austrina* group. Of these, the *bicolor* group is the most easily characterized, and it is undoubtedly monophyletic because it is based on several synapotypic character states. The *austrina* group is probably monophyletic, although the only synapotypy used to establish its monophyly is not certain (the

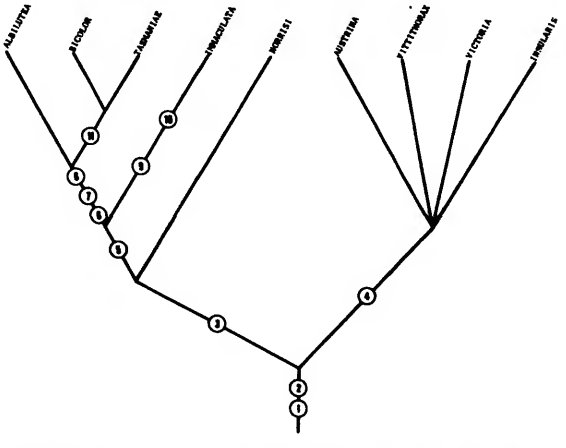


Figure 1.—Hypothetical phylogeny for the Australian species of the subgenus *Neoscatella* (based on the character states outlined in Table 1).

TABLE 1.—Characters and character states used in cladistic analysis of the Australian species of subgenus *Neoscatella*

Characters	*Plesiotypic*	*Apotypic*
1. Vestiture of mesofrons	bare to thinly pollinose	mostly pollinose
2. Costa of male wing	same as female	first, and usually second, section thickened
3. Body coloration	mostly brown	mostly gray
4. Vestiture of mesofrons (see no. 1)	mostly pollinose	pollinose except laterad of ocellar triangle
5. Coloration of tarsi	concolorous with tibiae, mostly blackish	paler than tibiae, brownish to yellowish
6. Setae of epandrium and surstyli	numerous and dark colored	sparse and pale colored
7. Body setae generally	appearing numerous and conspicuously evident	appearing sparse and smaller
8. Facial setae	3–4 porrect to upcurved facial setae between interfoveal carina and posteroventral angle	1 small seta between interfoveal carina and posteroventral angle
9. Costa of male (see no. 2)	thickened	secondarily narrowed, similar to female
10. Male terminalia	2 median processes closely appressed	2 median processes widely separate, forming a U-shaped emargination
11. Face conformation	anterior surface perpendicular to oral margin and not projecting anteriorly as far	anterior surface rounded, conspicuously projecting

most pollinose frons, with thinly pollinose to bare areas laterad of the ocellar triangle, is also found in a South African species *Scatella* (*Neoscatella*) *stuckenbergi* (Wirth); the latter species may represent the sister group to the Australian species). In contrast to the other two species-groups, the *immaculata* group is artificial. It is obviously paraphyletic, and we use it for convenience only.

Of the characters listed and used to support the cladogram, two need further clarification. Most specimens of the genus *Scatella* are mostly brown to dark brown with some gray to grayish tan coloration. In the Australian species, there is a trend toward more grayish coloration. The grayish coloration becomes progressively more dominant and conspicuous in specimens of the *immaculata* group and especially of the *bicolor* group. The second trend, which corresponds with the coloration trend, is for greater pollinosity on the frons. In specimens of the *austrina* group the frons is mostly pollinose except just laterad of the ocellar triangle, where the pollinosity is very thin to absent. In the *immaculata* group, specimens of *S. norrisi* are slightly more pollinose laterad of the ocellar triangle, and those of *S. immaculata* and of the *bicolor* group are entirely pollinose, appearing completely dull. The third character is the thickened costa of the male wings. All known Australian species, except *S. immaculata* and *S. vittithorax* Malloch, have a thickened first costal section, and frequently the second section is thicker, although not to the same degree as the first section (there is a possibility that the costa of males of *S. victoria* will also not be thickened, but no males are available for confirmation). Because six, possibly seven, of the nine species have a thickened costa, we are interpreting this state to be synapotypic for the Australian species. This means that the typical condition, as found in males of *S. immaculata* and *S. vittithorax*, are reversals, and in each case the unthickened costa represents an apotypy for the particular species. A thickened costa is also found in a few species of *Scatella*, sensu stricto (i.e., *S. bullacosta* Cresson).

Key to Australian Species of *Scatella* (*Neoscatella*)

1. Mesofrons uniformly and densely pollinose, appearing dull 2
   Mesofrons laterad of ocellar triangle thinly pollinose, appearing subshiny to shiny 6
2. At least 2 pairs of conspicuous porrect to slightly upcurved larger facial setae between dorsum of interfoveal carina and posteroventral corner of face 3
   Facial setae generally inconspicuous except for 1 pair of larger, porrect to slightly upcurved setae inserted near lateral margin of face 4
3. Pollinose vestiture of mesonotum generally gray except for brown stripe along acrostichal track; infuscation of wing darker, brownish, pattern of white spots distinctly contrasting; first section of costal vein thickened in male; white area of cell R_3 of male wing reduced or lacking, if present, narrow and attenuated medially, appearing as 2 spots; front coxa and femur similar in both sexes .....5. ***S. norrisi***, new species (in part)
   Pollinose vestiture of mesonotum unicolorous, gray to lightly yellowish gray; infuscation of wing pale, lightly tan, pattern of white spots inconspicuous; first section of costal vein not thickened in male; white area of cell R_3 of male wing large, subquadrate; anteroventral surface of front coxa and ventrobasal surface of front femur with conspicuous patch of longer setae in male ..... 4. ***S. immaculata*** Malloch
4. Frons bicolored, mesofrons brown, parafrons lightly tannish white ..... 3. ***S. tasmaniae***, new species
   Frons unicolorous 5
5. Male face mostly whitish; male wing lightly infuscated apically, white spots in apical two-thirds large, female face below interfoveal carina mostly whitish, at most with small area just below carina lightly yellowish; female wing with apical white spot in cell R_5 quadrate .....1. ***S. albilutea***, new species
   Male face below interfoveal carina dark brown, becoming yellowish along oral margin; apical two-thirds of male wing almost entirely infuscated, dark brown; female face below interfoveal carina uniformly yellowish; female wing with apical white spot in cell R_5 rectangular, narrowly transverse ..... 2. ***S. bicolor***, new species
6. Cell R_3 with 2 white spots, one aligned slightly apical of posterior crossvein, the other in apical one-fourth of cell .....8. ***S. victoria*** (Cresson)
   Cell R_3 with 1 white spot nearly aligned with posterior crossvein, or spot lacking 7
7. Mesonotum mostly grayish except for a moderately broad longitudinal stripe along acrostichal track and 2 faint, narrow stripes along dorsocentrals .....5. ***S. norrisi***, new species (in part)
   Mesonotum mostly brown to dark brown, with some, mostly anterior, grayish areas 8
8. Costal vein of male normal, not thickened; female wing with 1 large narrowly rectangular white area in cell R_5 apicad of posterior crossvein,

aligned perpendicular to longitudinal veins; large white area in cell R_3 subquadrate ..... 7. ***S. vittithorax*** Malloch

Costal vein of male thickened; female wing with 2 spots in cell R_5 apicad of posterior crossvein, if connected to form 1 white area, aligned obliquely to longitudinal veins; large white area in cell R_3 attenuated medially, frequently appearing as 2 spots, posterior one wider 9

9. Wing with 2 subapical white spots in cell R_5 aligned almost perpendicularly to longitudinal veins; female wing sometimes with a pale spot at base of cell R_1; male specimens with oral setae denser and longer, especially toward median ..... 9. ***S. insularis***, new species

Wing with both subapical white spots (sometimes connected) in cell R_5 aligned markedly obliquely to longitudinal veins; female wing without pale spot at base of cell R_1; oral setae in male similar to female ..... 6. ***S. austrina***, new species

The *bicolor* Group

SPECIES INCLUDED.—*Scatella (Neoscatella) albilutea*, new species; *S. (N.) bicolor*, new species; *S. (N.) tasmaniae*, new species.

DIAGNOSIS.—Specimens of this species-group may be distinguished by the following combination of character states: setae generally reduced in size and number; body generally more pollinose; frons entirely pollinose; facial setae uniformly reduced, inconspicuous, except for 1 pair of slightly upcurved to porrect setae near posteroventral angle of face; tarsi yellowish, becoming darker apically; fused surstyli and ventral margin of epandrium not conspicuously setose, setae small and pale.

DISCUSSION.—The species comprising this species-group form a monophyletic assemblage, as is evident from the many synapotypies (Figure 1, Table 1). This species-group is also structurally the most divergent (see diagnosis).

All three species of this group occur on seashores, or nearby, and are apparently able to tolerate saline conditions. The distributions of *S. bicolor* and *S. albilutea* are broadly sympatric.

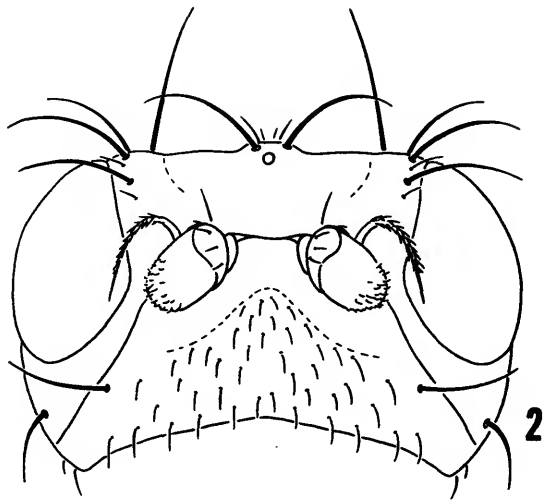
1. *Scatella (Neoscatella) albilutea*, new species

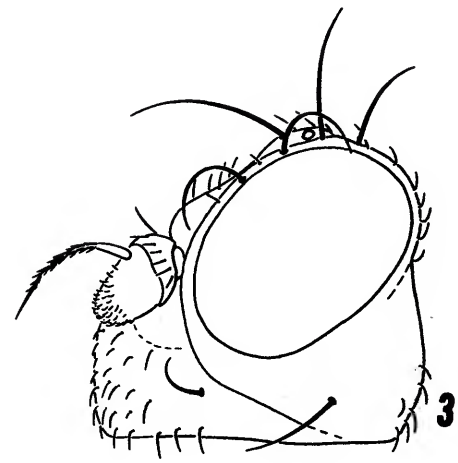
FIGURES 2–7

DIAGNOSIS.—Specimens of this species are most similar to those of *S. bicolor* and *S. tasmaniae* but may be distinguished from them and other congeners by the following combination of character states: frons uniformly and densely pollinose; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina moderately explanate, not creased, with short median sulcus; distance between antennal bases about equal to length of third antennal segment; face of both sexes more or less unicolorus and uniformly setulose with subequal small setulae except for 1 pair of large, slightly dorsally curved setae toward posteroventral angle; orientation of eye distinctly oblique to plane or oral margin; scutum and disc of scutellum more or less concolorous brown to slightly grayish brown, scutum lacking a distinct median stripe; setae of front coxa and femur similar in both sexes; tarsi yellowish, contrasting with gray femora and tibiae; first costal section of male wing uniformly thickened; brownish coloration of male wing slightly darker than that of female wing, but pattern and shape of white spots similar in both sexes; larger white spot in cell R_3 subquadrate, extending across width of cell; apical white spot in cell R_5 wide, subquadrate.

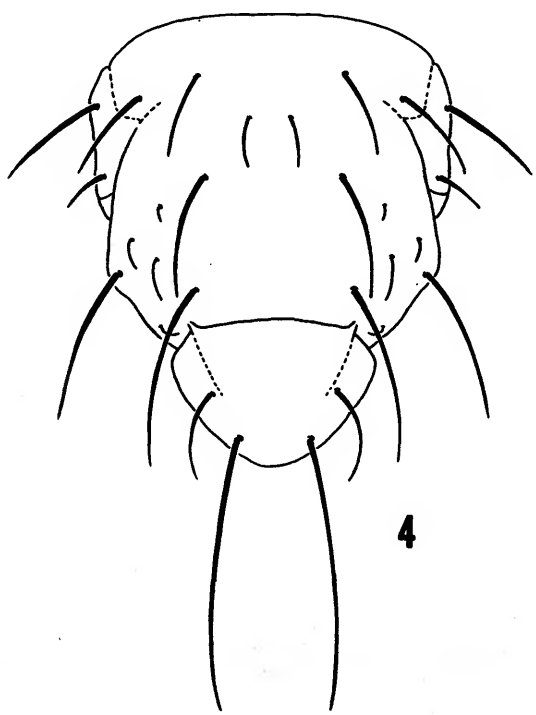
DESCRIPTION.—Moderately small shore flies, length 2.03 to 2.64 mm; mostly gray, with some whitish to lightly tannish coloration; almost entirely pollinose, appearing dull.

Head (Figure 2–3): Head width-to-height ratio averaging 1 : 0.67; frons entirely and uniformly pollinose, appearing dull whitish to very





FIGURES 2–4.—*S. albilutea:* 2, head, anterior aspect; 3, head, lateral aspect; 4, thorax, dorsal aspect.



faintly tannish gray, some specimens with ocellar triangle and areas immediately laterad and posteriad of ocellar triangle tannish; lacking distinctly colored mesofrons and parafrons, but latter also distinguished; lateroclinate fronto-orbital bristles subequal in length. Antenna uniformly concolorous with frons; third segment as long as combined length of first and second segments; distance between antennal bases greater than length of third segment; arista mostly appearing bare, setae small, sparse, hairlike. Faces of both sexes concolorous or nearly so, at most slightly darker than frons; dorsum of interfoveal carina only slightly explanate, with short median sulcus; 1 pair of porrect to slightly upcurved larger bristles toward posteroventral angle of face, otherwise facial setae uniformly small, pale, and inconspicuous. Clypeus slightly more shiny and whitish. Eye wider than high, eye width-to-height ratio averaging 1 : 0.89; oriented at oblique angle to plane of epistomal margin. Gena high, eye-to-cheek ratio averaging 1 : 0.51.

Thorax (Figure 4): Mostly pale gray except for partially to mostly brownish dorsomedian area between dorsocentral bristles and extending length of the mesonotum (including scutellum), but not distinctly vittate, brownish coloration on scutellum usually darker. Legs, except tarsi, nearly concolorous with remainder of thorax, sometimes less pollinose and tending to be slightly

amber colored at femoral-tibial articulation; tarsi yellowish, contrasting distinctly with grayish tibiae and femora, apical 2–3 tarsomeres becoming blacker. Wings sexually dimorphic (Figures 6–7); male wing differing as follows: costal margin thickened, especially first costal section; and infuscation darker; otherwise pattern as described in diagnosis.

Abdomen: Mostly unicolorous, whitish to silvery gray; lateral margins of terga 3–5 of some specimens with faint to obviously light brown areas.

TYPE MATERIAL.—Holotype male is labeled: "Thomas Riv estuary Esperance Distr WA [Western Australia] 5 Nov. 1977 D. H. Colless (Malaise Trap)/HOLOTYPE Scatella (Neoscatella) albilutea Mathis & Wirth [handwritten, red]." Allotype female and 36 paratypes (14♂, 22♀) have the same locality data as the holotype. Other paratypes as follows: NEW SOUTH WALES: COILA LAKE, Tuross Hds., 19 July 1973, Z. Liepa (5♂, 9♀; ANIC, USNM); CUTTAGEE LAKE, inlet, 8 km S Bermagui, 21 Jul 1973, Z. Liepa (1♀; ANIC); LAKE CURALO, Eden (nr. sandbar), 3 Aug 1973, Z. Liepa (8♂, 15♀; ANIC, USNM); LAKE MUMMUGA, Dalmeny, 20 Jul 1973, Z. Liepa (1♂; ANIC); MERIMBULA LAKE (nr. sandbar), 3 Aug 1973, Z. Liepa (4♂, 1♀; ANIC); NARRABEEN LAGOON, 12 Oct 1956, W. W. Wirth (3♂, 6♀; USNM); POTATO POINT, 9.5 km E Bodella, 20 Jul 1973, Z. Liepa (4♂, 1♀; ANIC); ROYAL NATIONAL PARK (nr. Sydney), 13 Aug 1971, D. K. McAlpine (1♀, AM); WALLAGA LAKE, Bermagui, 15–21 Jul 1973, Z. Liepa (2♂, 3♀; ANIC). VICTORIA: LAKES ENTRANCE, North Arm, 5 Aug 1973, Z. Liepa (4♂, 5♀, ANIC); MALLACOOTA INLET, SE Genoa, 4 Aug 1973, Z. Liepa (7♂, 6♀; ANIC, USNM); MARLO, Snowy River (estuary), 5 Aug 1973, Z. Liepa (3♀; ANIC); MORUYA RIVER (estuary), 19 Jul 1973, Z. Liepa (1♀; ANIC). The holotype, allotype, and most of the paratypes are in the Australian National Insect Collection, Canberra. The holotype specimen is doubled mounted (minute nadel in polyporous block) and is in excellent condition.

GEOGRAPHIC DISTRIBUTION (Figure 5).—Southern coast of New South Wales, eastern coast of Victoria, and south-central coast of Western Australia.

ETYMOLOGY.—The species epithet *albilutea* is of Latin derivation and means "whitish yellow," referring to the facial color of specimens of this species.

REMARKS.—This species occurs sympatrically with *S. bicolor*, and the two species are closely related.

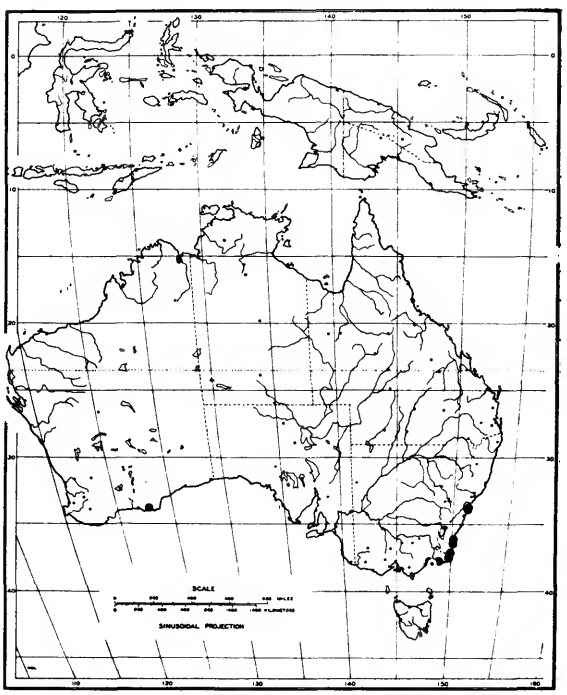


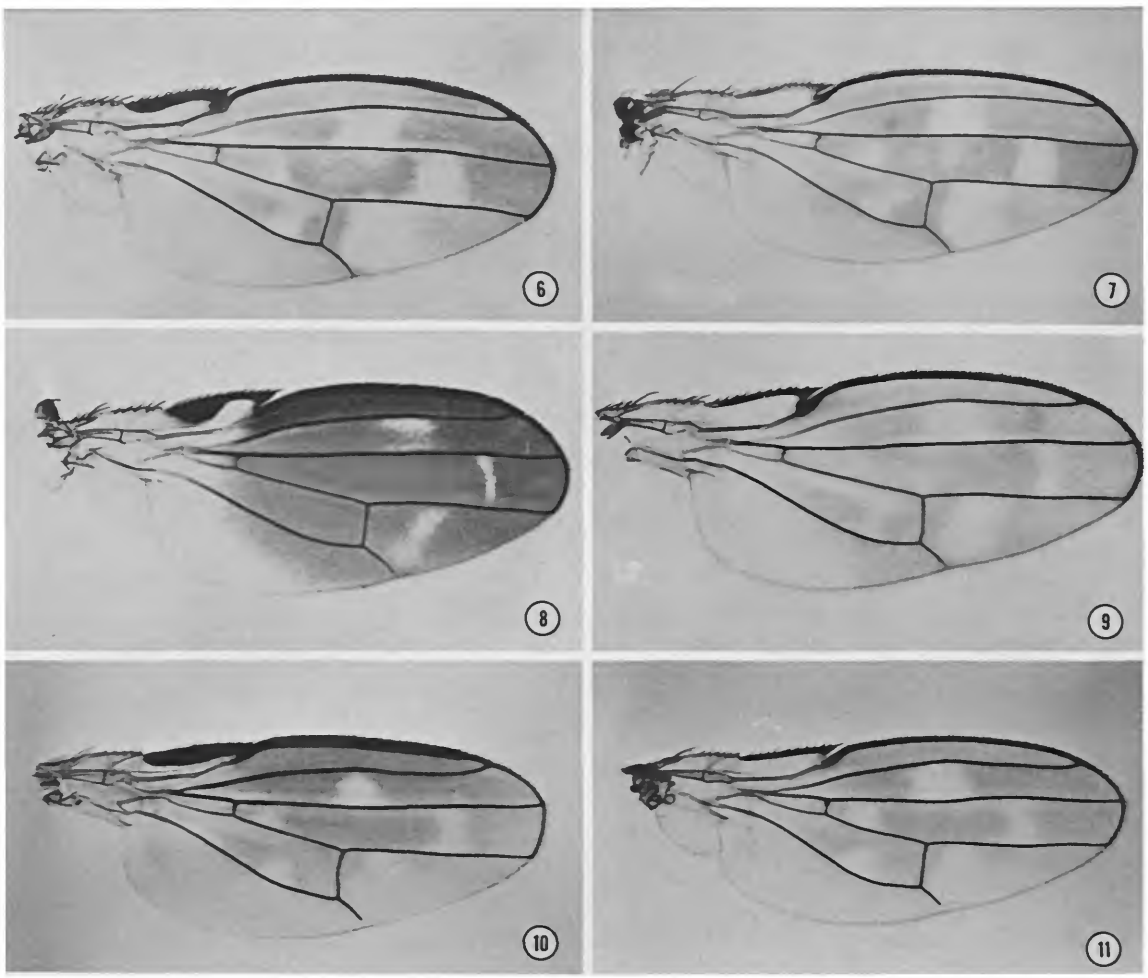
FIGURE 5.—Distribution map of *S. albilutea*.

Sexual dimorphism is not as evident in specimens of this species as it is in the other two species of this group.

2. *Scatella* (*Neoscatella*) *bicolor*, new species

FIGURES 8–9, 12–17

DIAGNOSIS.—Specimens of this species are most similar to those of *S. albilutea* and *S. tasmaniae* but may be distinguished from them and other congeners by the following combination of character states: frons uniformly and densely pollinose; anterior lacteroclinate fronto-orbital bristle generally shorter than posterior bristle; dorsum of interfoveal carina broadly explanate, not creased, with short median sulcus; distance between antennal bases about equal to combined length of second and third antennal segments; face of male deeply velvety brown on receding portion to just before oral margin which is yellowish gold; face



FIGURES 6–11.—Wings: 6, *S. albilutea*, male; 7, *S. albilutea*, female; 8, *S. bicolor*, male; 9, *S. bicolor*, female; 10, *S. tasmaniae*, male; 11, *S. tasmaniae*, female.

of both sexes uniformly setulose with subequal small setulae except for one pair of large, slightly dorsally curved setae toward posteroventral angle; orientation of eye distinctly oblique to plane of oral margin; scutum grayish to brownish, lacking a distinct median stripe; brownish coloration of disc of scutellum darker than grayish brown coloration of scutum; setae of front coxa and femur similar in both sexes; tarsi yellowish, contrasting with gray coloration of femora and tibiae; first costal section of male wing thickened, emarginate posteriorly on apical half; most of male wing apicad of anterior crossvein brown, white area in cell R_3 reduced, not extending more than one-half cell width, closely appressed to vein R_{2+3}; apical white spot in cell R_5 of female wing narrowly rectangular.

DESCRIPTION.—Small to moderately small shore flies, length 1.79 to 2.87 mm; mostly gray, but with considerable light brownish to yellowish

coloration; almostly entirely pollinose, appearing dull.

Head (Figures 12–13): Head width-to-height ratio averaging 1 : 0.63; frons uniformly and entirely pollinose, appearing dull, mostly gray, but with very faint tannish to slightly bluish coloration, most specimens with some coloration distinction between mesofrons and parafrons, vertex usually faintly distinguished in color, mesofrons distinguished from parafrons by shallowly impressed sulcus; anterior lateroclinate fronto-orbital bristles slightly smaller than posterior bristle, especially in males. Antenna mostly concolorous with mesofrons or slightly darker, third segment faintly yellowish to pinkish basally; third antennal segment subequal to slightly longer than combined length of first and second segments; arista appearing mostly bare, setae small, hairlike; distance between antennal bases large, usually greater than length of antenna. Coloration and conformation of face sexually dimorphic. Male: obviously explanate dorsally, with distinct anteromedian sulcus, angle between dorsal and anterior aspects of face more angulate; anterior aspect of face dark, velvety brown to yellowish oral margin, both colors contrasting with dorsum, which is mostly gray to faintly bluish gray. Female: moderately explanate dorsally; anterior aspect mostly lightly yellowish, contrasting only slightly with dorsum, which is mostly grayish, some specimens also with faint bluish to pinkish coloration. Facial setae in both sexes small, hairlike, inconspicuous except for 1 pair of larger, porrect to slightly upcurved bristles inserted toward posteroventral angle of face. Clypeus narrow, mostly concolorous with ventral margin of face. Eye broadly elliptical, more so in male, oriented at distinct, oblique angle to plane of epistomal margin; eye width-to-height ratio averaging 1 : 0.94; gena moderately high, eye-to-cheek ratio averaging 1 : 0.31.

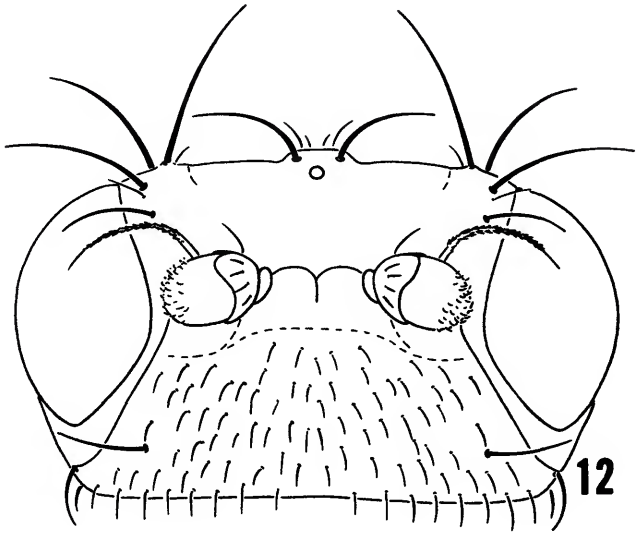
Thorax (Figure 14): Coloration of male more contrasting and distinct. Mesonotum mostly gray but with distinct light brown to brown area between dorsocentral bristles and extending entire length, becoming fainter just before scutellum, scutellum coloration darker; humeral callus, notopleuron, and immediate area gray to faintly bluish gray, in male distinctly contrasting with surrounding coloration; mesopleuron and pteropleuron, especially in male, yellowish to brownish yellow, coloration becoming lighter posteriorly on pteropleuron, sternopleuron gradually becoming lighter. Legs concolorous; femora and tibiae gray, femoral-tibial articulation amber colored; tarsi yellowish, becoming darker apically but not distinctly blackish. Wings (Figures 8–9) sexually dimorphic; male wing differing as follows: Costa thickened, especially first costal section; infuscation much darker; white areas more narrowly defined; otherwise wing as described in diagnosis.

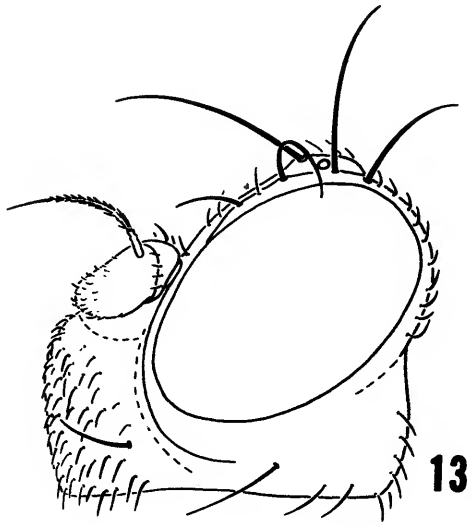
Abdomen: Mostly unicolorous; dorsum mostly gray, but with faint bluish to greenish coloration; lateral margins, especially on apical terga, with faint to fairly distinct brownish area. Male terminalia as in Figures 15–16.

TYPE MATERIAL.—Holotype male is labeled: "Narrabeen Lagoon NSW 12 Oct 1956 tidal flat/W. W. Wirth collector/HOLOTYPE Scatella (Neoscatella) bicolor Mathis & Wirth [handwritten, red]." Allotype female and 82 paratypes (52♂, 30♀) have the same label data as the holotype. Other paratypes as follows: NEW SOUTH WALES: BERMAGUI BEACH, 24 Nov 1974, Z. Liepa (12♂, 13♀; ANIC, USNM); COILA LAKE, Tuross Hds., 19 Jul 1973, Z. Liepa (17♂, 7♀; ANIC, USNM); DEE WHY, 24 Feb 1957, 31 Mar 1962, 4 Nov 1971, W. W. Wirth, D. K. McAlpine, G. A. Holloway (3♂, 7♀; AM, USNM); KURNELL, 3 May 1931, K. McKeown (1♂, 1♀; AM); LAKE CURALO, Eden, 3 Aug 1973, Z. Liepa (2♀; ANIC); POTATO POINT, 9.5 km E Bodalla, 20 Jul 1973, Z. Liepa (4♂, 6♀; ANIC, USNM); WALLAGA LAKE, 15–21 Jul 1973, Z. Liepa (6♂, 4♀; ANIC, USNM). WESTERN AUSTRALIA: THOMAS RIVER (estuary), Esperance District, 8 Nov 1977, Z. Liepa (3♂, 3♀; ANIC). The holotype, allotype, and some of the paratypes will be deposited in the Australian National Insect Collection, Canberra. The remaining paratopotypes will be in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. The holotype specimen is double mounted (minute nadel in polyporus block) and is in excellent condition.

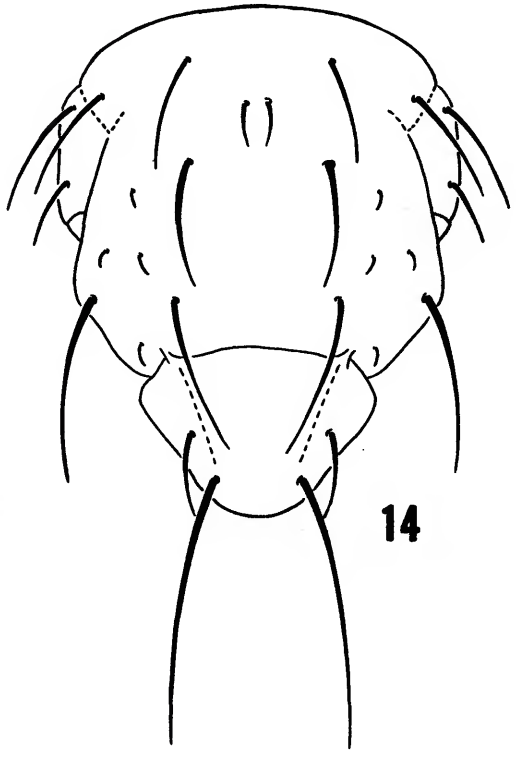
GEOGRAPHIC DISTRIBUTION (Figure 17).—Southern coast of New South Wales and south-central coast of Western Australia.

ETYMOLOGY.—The species epithet *bicolor* is of





FIGURES 12–14.—*S. bicolor:* 12, head, anterior aspect; 13, head, lateral aspect; 14, thorax, dorsal aspect.

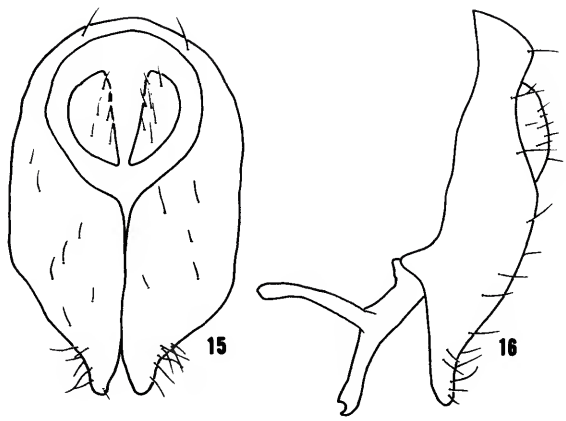


Latin derivation and means "two-colored," referring to the two-toned face of specimens of this species.

3. *Scatella* (*Neoscatella*) *tasmaniae*, new species

FIGURES 10–11, 17–20

DIAGNOSIS.—Specimens of this species are most similar to those of *S. bicolor* and *S. albilutea* but may be distinguished from them and other congeners by the following combination of character states: frons uniformly and densely pollinose, bicolored, mesofrons light tannish brown to yellowish brown, contrasting with more whitish parafrons; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina broadly produced, semiexplanate, evenly rounded, not creased, with short dorsomedian sulcus; distance between antennal bases about equal to combined length of second and third antennal segments; facial conformation and coloration similar in both sexes, protruding ante-



FIGURES 15–16.—*S. bicolor:* 15, epandrium, cerci, and fused surstyli, posterior aspect; 16, epandrium, cercus, fused surstylus, and gonite, lateral aspect.

riorly, length in profile nearly equal to width of eye, median portion mostly whitish, posteroventral angle becoming concolorous with mesofrons, light tannish to yellowish brown, uniformly setulose with subequal small setuale except for one pair of large, slightly dorsally curved setae toward posteroventral angle; orientation of eye distinctly oblique to plane of oral margin; scutum and scutellum concolorous with mesofrons, laterally becoming grayer, but lacking a distinct median stripe; setae of front coxa and femur similar in both sexes; tarsi yellowish, contrasting with gray coloration of femora and tibiae; first costal section of male wing uniformly thickened; brownish coloration of male wing darker than that of female wing, but pattern and shape of white spots similar in both sexes, generally reduced; larger white spot in cell R_3 subquadrate, extending across width of cell; other white spots not clearly differentiated.

DESCRIPTION.—Moderately small shore flies, length 2.49 to 2.91 mm; mostly gray, but with considerable tannish gold to yellowish tan coloration; almost entirely pollinose, appearing dull.

Head (Figures 18–19): Head width-to-height ratio averaging 1 : 0.66; frons uniformly and entirely pollinose, appearing dull; mesofrons and dorsal portion of parafrons yellowish tan to golden, contrasting with gray to whitish gray anterior portion of parafrons, anterior margin of mesofrons in some specimens becoming gray; parafrons differing in conformation from mesofrons; anterior lateroclinate fronto-orbital bristle subequal or slightly shorter than posterior fronto-orbital. Antenna mostly unicolorous, base of third segment appearing paler, slightly pinkish, in some specimens; length of third segment about equal to combined length of first and second segments; arista appearing mostly bare, setae sparse and small, hairlike; distance between antennal bases wide, equal to combined length of second and third segments. Face protruding anteriorly, dorsum moderately explanate and with short, dorsomedian sulcus; facial setae mostly small, pale, and inconspicuous except for 1 large pair of porrect to slightly upcurved bristles inserted toward posteroventral angle of face; facial coloration bicolored, dorsum and most of anterior surface whitish gray, posterolateral angle of face yellow-

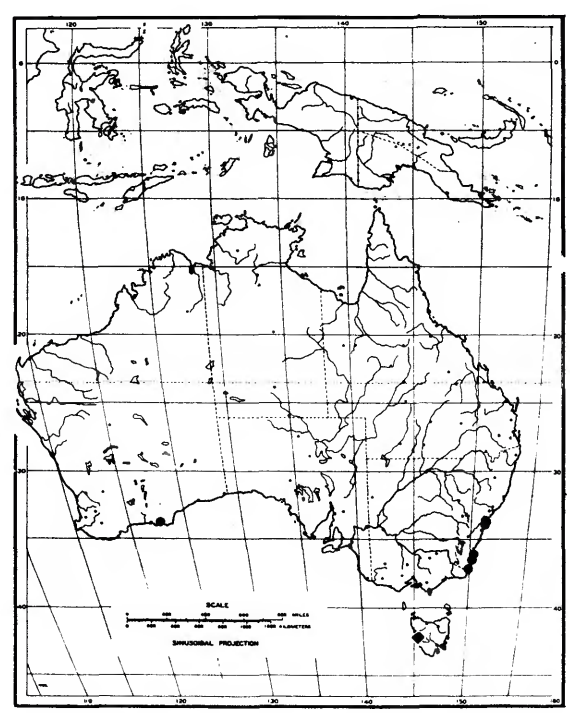
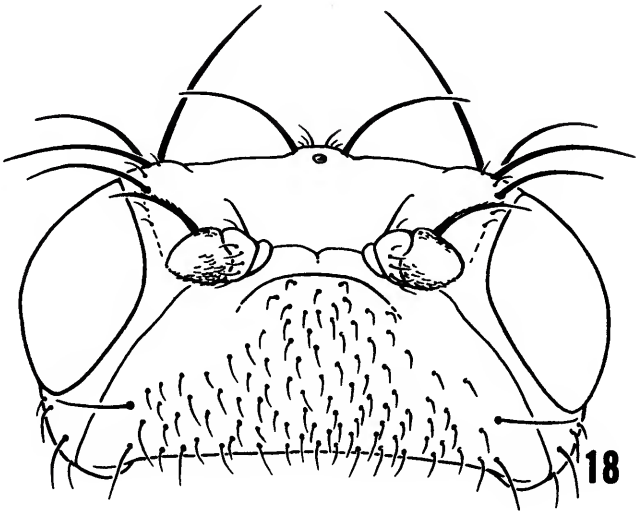
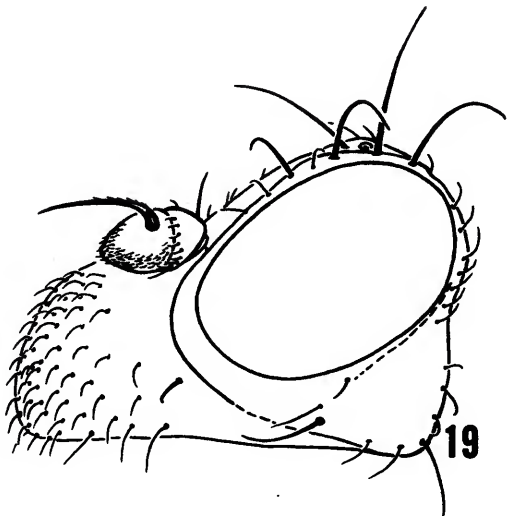
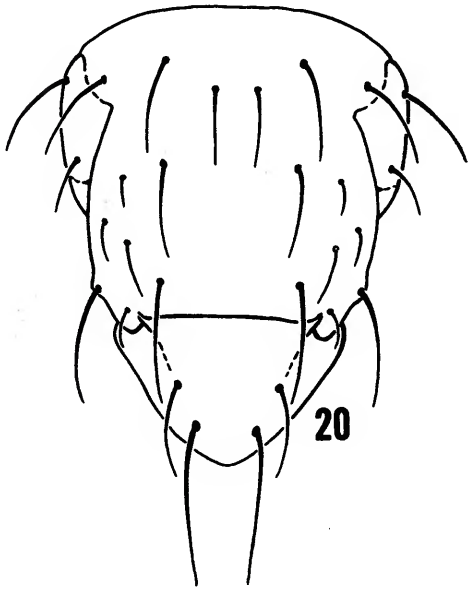


FIGURE 17.—Distribution map of *S. bicolor* (circles) and *S. tasmaniae* (diamond).







FIGURES 18–20.—*S. tasmaniae:* 18, head, anterior aspect; 19, head, lateral aspect; 20, thorax, dorsal aspect.

ish gold, yellowish gold coloration extending posterodorsally through parafacies to eye. Eye broadly elliptical, oriented at distinct oblique angle to plane of epistomal margin; eye width-to-height ratio averaging 1 : 1. Gena moderately high, eye-to-cheek ratio averaging 1 : 0.29; mostly gray to very faintly tannish gray, becoming slightly darker posteriorly. Clypeus narrow, slightly darker gray than coloration of anterior portion of face.

Thorax (Figure 20): Dorsomedian portion of mesonotum yellowish brown to grayish brown, becoming darker posteriorly, especially disc of scutellum, anteriorly gray, usually with small, narrow, and short gray indentation into brownish coloration; humeral callus, notopleuron, supra-alar area and lateral margins of scutellum mostly gray to whitish gray; mesopleuron, especially posterodorsal portion, yellowish brown to golden, concolorous with dorsomedian area of mesonotum; remaining pleural areas mostly gray. Legs, except for tarsi, mostly uniformly gray, concolorous with lower pleural coloration; tarsi yellowish, apical 1–2 tarsomeres becoming darker, sometimes blackish. Wings (Figures 10–11) sexually dimorphic; male wing differing as follows: costal margin thickened, especially first costal section; infuscation darker brown. Pattern of light and dark areas similar in both sexes.

Abdomen: Dorsum mostly unicolorous, gray, some specimens with very faint bluish tint to gray; lateral margins of terga 3–5 with brownish

areas, becoming darker on posterior terga.

TYPE MATERIAL.—Holotype male is labeled: "Ocean Beach Strahan, Tas. 14 Nov. 1975 K. R. Norris/AUST. NAT. INS. COLL. [green]/HOLOTYPE Scatella (Neoscatella) tasmaniae Mathis and Wirth [handwritten, red]." Allotype female and five paratypes [2♂, 3♀], have the same locality data as the holotype. The holotype, allotype, and most of the paratypes are in the Australian National Insect Collection, Canberra. A male and female paratype are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. The holotype specimen is double mounted (minute nadel in polyporous block) and is in excellent condition.

GEOGRAPHIC DISTRIBUTION (Figure 17).—Western coast of Tasmania.

ETYMOLOGY.—The species epithet *tasmaniae* is a Latinized genitive noun, referring to the type-locality, Tasmania.

The *immaculata* Group

SPECIES INCLUDED.—*Scatella* (*Neoscatella*) *immaculata* Malloch; *S.* (*N.*) *norrisi*, new species.

DIAGNOSIS.—Specimens of this species-group may be distinguished by the following combination of character states: setae generally well developed and relatively abundant; body generally more pollinose, frons entirely to more thinly pollinose around ocellar triangle; mesonotum mostly gray, at most with median stripe and narrow stripe along acrostichal setae brown; facial setae very evident, with 3–4 large, porrect to slightly upcurved setae aligned between interfoveal carina and posteroventral angle of face; tarsi mostly concolorous with tibiae, at most brownish; male terminalia variable.

DISCUSSION.—This species-group is paraphyletic, as it does not include the *bicolor* group, and we recognize it solely for convenience. Both of the species assigned here are intermediate between the other two species-groups.

4. *Scatella (Neoscatella) immaculata* Malloch

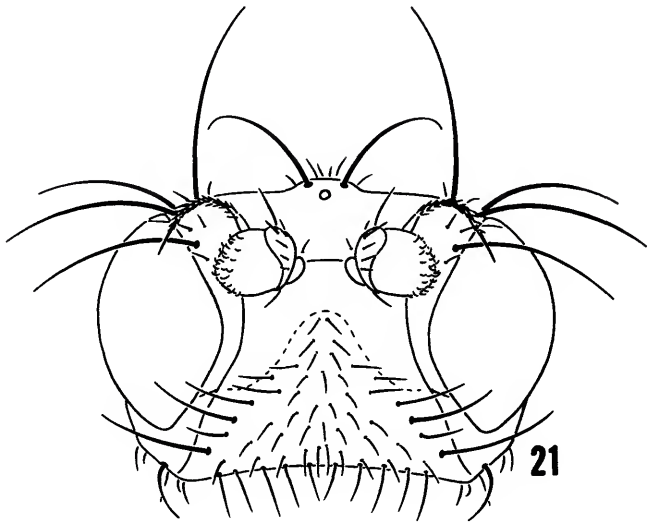
FIGURES 21–26, 30–31

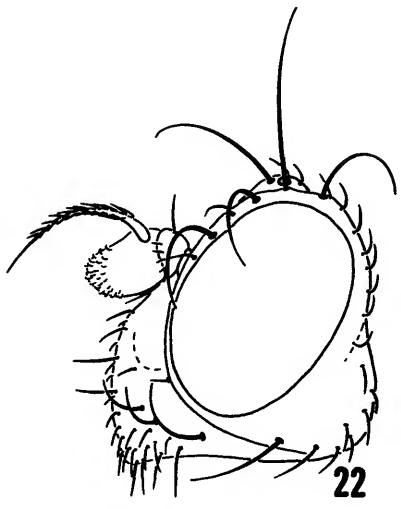
Scatella immaculata Malloch, 1925:331
Neoscatella immaculata.—Cresson, 1935:360.

DIAGNOSIS.—Specimens of this species are similar to those of *S. albilutea* and *S. bicolor* but may be distinguished from them and other congeners by the following combination of character states: frons uniformly and densely pollinose; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of second or third antennal segment; coloration of face in both sexes similar, grayish yellow; marginal facial setae distinctly larger than those along median surface, with two to three pairs of large, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; orientation of eye at slight oblique angle to plane of oral margin; coloration of scutum and scutellum more or less uniformly concolorous, grayish brown, scutum lacking a darker colored median stripe; anteroventral surface of front coxa and ventrobasal surface of front femur of male with distinct patch or tuft of longer setae; tarsi stramineous, becoming darker apically, contrasting with grayish coloration of femora and tibiae; first section of costal vein not thickened in male wing; wing maculation of both sexes similar; membrane except for white areas uniformly light brown, becoming gradually but only slightly darker toward apex; large white spot in cell R_3 subquadrate, extending across entire cell; apical white spot in cell R_5 narrowly subrectangular.

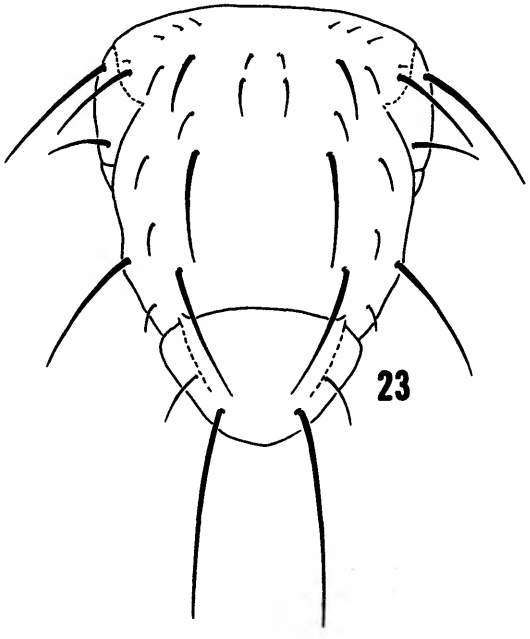
DESCRIPTION.—Small to moderately small shore flies, length 1.53 to 2.46 mm; mostly gray, but with some light yellowish tan coloration; almost entirely pollinose, appearing dull.

Head (Figures 21–22): Head width-to-height ratio averaging 1 : 0.58; frons uniformly and entirely pollinose, appearing dull; mesofrons and parafrons not well differentiated by color distinction, mostly light brownish gray, parafrons in some specimens slightly more grayish; lateroclinate fronto-orbital bristles subequal in length. Antenna mostly unicolorous, dark gray; third segment about as long as combined length of first and second segments; arista mostly appearing bare, setae small and sparse, hairlike: distance





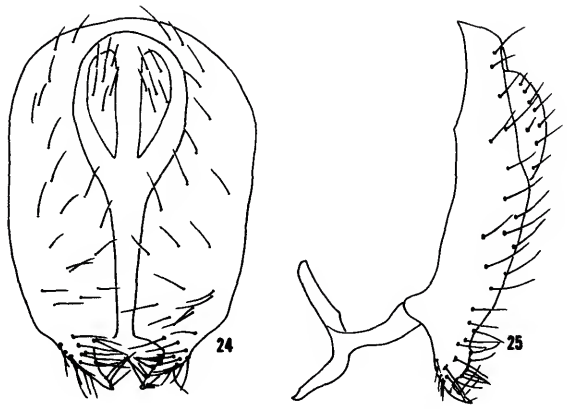
FIGURES 21–23.—*S. immaculata:* 21, head, anterior aspect; 22, head, lateral aspect; 23, thorax, dorsal aspect.



between antennal bases short, less than length of third segment. Face mostly concolorous with frons; conspicuously setose, marginal setae especially strong, with 3–4 pairs of strong bristles aligned between interfoveal carina and posteroventral angle of face; interfoveal carina distinct, lacking dorsomedian short sulcus. Eye nearly round, eye width-to-height ratio averaging 1 : 1. Gena moderately low, eye-to-cheek ratio averaging 1: 0.21; coloration mostly whitish gray. Clypeus not generally exposed.

Thorax (Figure 23): Mostly gray, some specimens with very faint light tannish areas dorsally, these blending gradually with grayish coloration, not distinct; setae more apparent. Legs, except tarsi, gray, concolorous with pleural coloration; tarsi yellowish brown. Wing of male and female (Figures 30–31) not differing substantially; infuscation of male wing usually slightly darker; otherwise pattern as described in diagnosis.

Abdomen: Mostly unicolorous, gray to very faintly bluish gray; lateral margins of terga mostly concolorous with dorsum, some specimens with indistinct, very faint brown coloration. Male terminalia (Figures 24–25) as follows: epandrium and fused surstyli conspicuously setose, especially ventral apices; ventral margin in posterior view



FIGURES 24–25.—*S. immaculata:* 24, epandrium, cerci, and fused surstyli, posterior aspect; 25, epandrium, cercus, fused surstylus, and gonite, lateral aspect.

terminating in 2 acutely pointed inwardly projecting processes that in profile are curved posteriorly.

TYPE MATERIAL.—Holotype female is labeled: "N. S. Wales Berlaringer 9.9.23 [9 Sep 1923] Health Dept./Scatella immaculata Type Det J R Malloch [black suborder; species name and word "Type" handwritten]." The holotype is in the School of Public Health and Tropical Medicine, University of Sydney, Sydney, New South Wales. The only paratype (the female allotype) that Malloch (1925) mentioned in the original description is in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. The holotype specimen is double mounted (minute nadel in polyporus block) and is in good condition, although some of the setae on the left side of the head are missing.

OTHER SPECIMENS EXAMINED.—AUSTRALIA. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, 29 Apr–8 Oct 1968, I. F. B. Common (4♂, 1♀; ANIC, USNM); Canberra, 7 Nov 1929, A. Tonnoir (1?; ANIC); Lake Burley, Griffin, 31 Oct 1963, D. H. Colless (1?; ANIC). NEW SOUTH WALES: Careel Bay, 20 Sep 1956, W. W. Wirth (1♀; USNM); Shoalhaven River, Braidwood Road, 4 Oct 1973, Z. Liepa (1♂, 2♀; ANIC); Tumut Plains, Little River, 21 Sep 1963, Z. Liepa (2♀; ANIC). NORTHERN TERRITORY: Alice Springs, 41 km SE, 4 Oct 1978, D. H. Colless (7♂, 7♀; ANIC, USNM); Alice Springs, 39 km E, 5 Oct 1978, D. H. Colless (1♂, 1♀; ANIC); Alice Springs, 53 km NE, 6 Oct 1978, D. H. Colless (1♂, 1♀; ANIC); Alice Springs, 30 km WNW, 7 Oct 1978, D. H. Colless (1♀; ANIC); Alice Springs, 32 km WNW, 9 Oct 1978, D. H. Colless (1♂; ANIC); Entire Creek, 155 km ENE Alice Springs, 13 Oct 1978 (1♂; ANIC); Plenty Highway, 187 km ENE Alice Springs, 14 Oct 1978 (4♂; ANIC); Roe Creek, 12 km WSW Alice Springs, 10 Oct 1978, D. H. Colless (1♂, 2♀; ANIC); Todd River, 9 km NE Alice Springs, 11 Oct 1978, D. H. Colless (1♀; ANIC). QUEENSLAND: Darr River, 31 km NNW Longreach, 7 Apr 1976, D. H. Colless (1♀; ANIC); Longreach, F. H. Taylor (2♀; USNM); The Warburton, 2 km NE Kalamuriatts, 17 Sep 1972, Z. Liepa (1♂, 10♀; ANIC, USNM); Urandangi, 90 km SSW Illungnarra (water hole), 15 Oct 1978, D. H. Colless (1♂; ANIC). SOUTH AUSTRALIA: Allandale, 16 km SE Oodnadatta, 24 Sep 1972, Z. Liepa (1♀; ANIC); Coward Springs NW Marree, 22 Sep 1972, A. Liepa (1♂, ANIC); Goyder Lagoon Water hole B/ville track, 18 Sep 1972, Z. Liepa (6♀, ANIC); Marree, 4.8 km NE, 15 Sep 1972, Z. Liepa (3♂, 6♀; ANIC, USNM); Mt. Crawford State Forest, 6 Aug 1968, Colless and Liepa (1♂; ANIC); Mungeranie Bore, 67.6 km N Cooper's Creek, 17 Sep 1972, Z. Liepa (3♀; ANIC); Old Alton Downs, Simpson Desert, 19 Sep 1972, Z. Liepa (1♀; ANIC); Oodnadatta, 33 km SES, 23 Sep 1972, Z. Liepa (2♀; ANIC).

GEOGRAPHIC DISTRIBUTION (Figure 26).—Central and western Queensland, eastern New South Wales, Australian Capital Territory, northwestern South Australia, and south-central Northern Territory.

REMARKS.—This species is an anomaly for

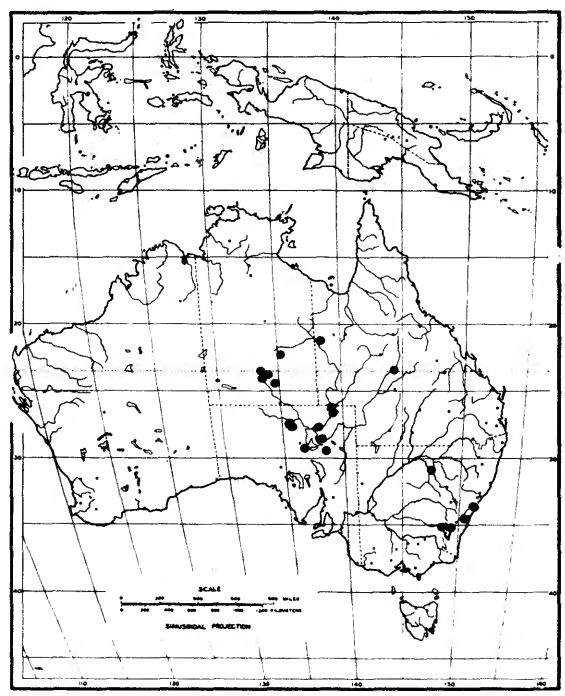


FIGURE 26.—Distribution map of *S. immaculata.*

three reasons. First, it is the only species that is known to occur inland as well as in coastal habitats. Second, the costal section of the wing of both males and females is similar. [We are interpreting this condition to be secondary, a reversal, as other character states ally this species with those of the *bicolor* group (the completely pollinose frons; the tendency for more grayish coloration; and the lighter colored tarsi). Otherwise, we would have to interpret these character states as the result of convergence, which parsimony precludes without evidence to the contrary.] Third, the conformation of the male terminalia is different from that of any other species, especially the shape and placement of the fused surstyli (see diagnosis and Figure 24).

5. *Scatella (Neoscatella) norrisi*, new species

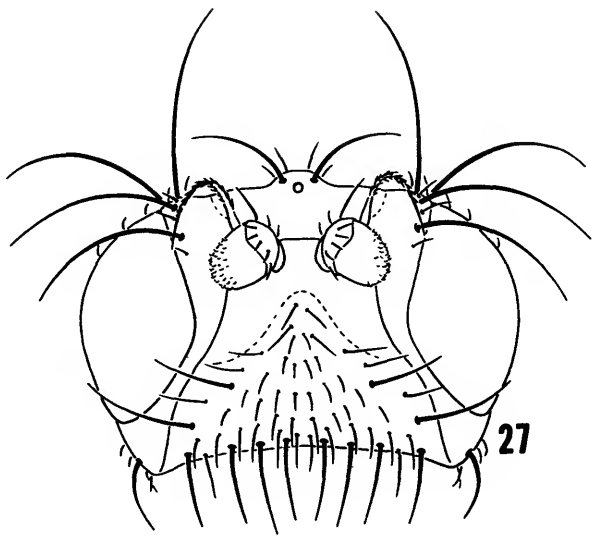
FIGURES 27–29, 34–36

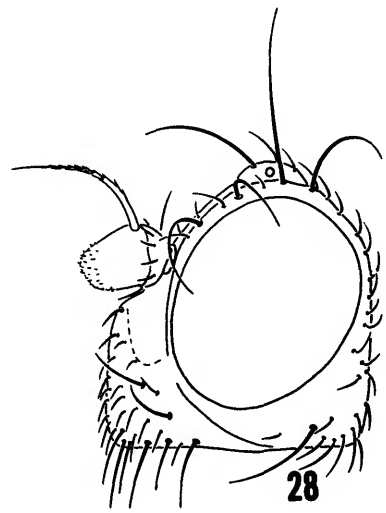
DIAGNOSIS.—Specimens of this species are similar to those of *S. immaculata* and *S. austrina* but may be distinguished from them and other congeners by the following combination of character states: frons pollinose although more thinly so anterolaterad of ocellar triangle; lacteroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of second or third antennal segment; coloration of face in both sexes similar, light grayish yellow; marginal facial setae distinctly larger than those along median surface, with two to three pair of large, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; orientation of eye at slight oblique angle to plane of oral margin; scutum with brownish median stripe along acrostichal track, contrasting distinctly with grayish coloration on rest of scutum; disc of scutellum gray to bluish gray; setae of front coxa and femur similar in both sexes; tarsi blackish brown, concolorous with femora and tibiae; first costal section of male wing thickened, thickened portion becoming gradually narrower apically; larger white area in cell R_3 subquadrate in female wing, in male wing weakly developed or lacking, if present narrow and attenuated medially, appearing more or less as two spots; apical white area in cell R_5 narrowly rectangular in both sexes.

DESCRIPTION.—Small to moderately small shore flies, length 1.97 to 2.34 mm; mostly gray, but with considerable yellowish gold to brown coloration; mostly pollinose, appearing dull.

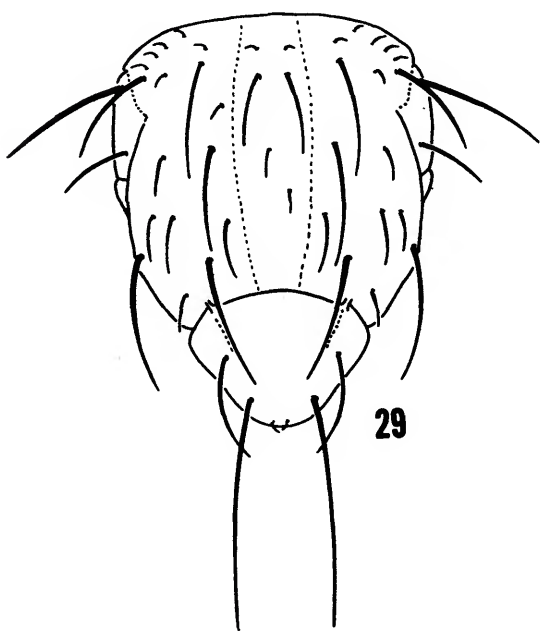
Head (Figures 27–28): Head width-to-height ratio averaging 1 : 0.67; frons entirely pollinose, more sparsely so laterad of ocellar triangle, appearing subshiny; coloration of frons mostly gray to tannish gray, mesofrons separated from parafrons by faintly charcoalish, greenish gray, more membranous appearing wedges, ocellar triangle darker than mesofrons, distinctly brownish; lateroclinate fronto-orbital bristles subequal in length. Antenna with first and second segments faintly blackish gray; third segment more brownish gray; length of third segment subequal or slightly longer than combined length of first and second segments; arista with short, hairlike setae dorsally, mostly appearing bare; distance between antennal bases short, less than length of third segment. Face mostly unicolorous, light yellowish gray; facial setae distinct, those along margin stronger, with 3–4 longer setae aligned between interfoveal carina and posteroventral angle of face. Eye subelliptical to round, eye width-to-height ratio averaging 1 : 1; oriented at almost perpendicular angle to plane of epistomal margin. Gena moderately low, eye-to-cheek ratio averaging 1 : 0.21, more whitish gray, but becoming more yellowing posteriorly. Clypeus generally concealed.

Thorax (Figure 29): Mostly gray, but with considerable light brown to brown coloration; mesonotum gray except for median brown stripe (through acrostichal area), some specimens with faint indication of a narrow stripe along dorsocentrals tract; mesopleuron and anterior portion of pteropleuron grayish brown; ventral pleural areas mostly gray. Legs concolorous, gray to blackish; femora mostly gray; tibiae mostly grayish black to black, becoming darker toward apices; tarsi blackish. Wings sexually dimorphic (Fig-





FIGURES 27–29.—*S. norrisi:* 27, head, anterior aspect; 28, head, lateral aspect; 29, thorax, dorsal aspect.



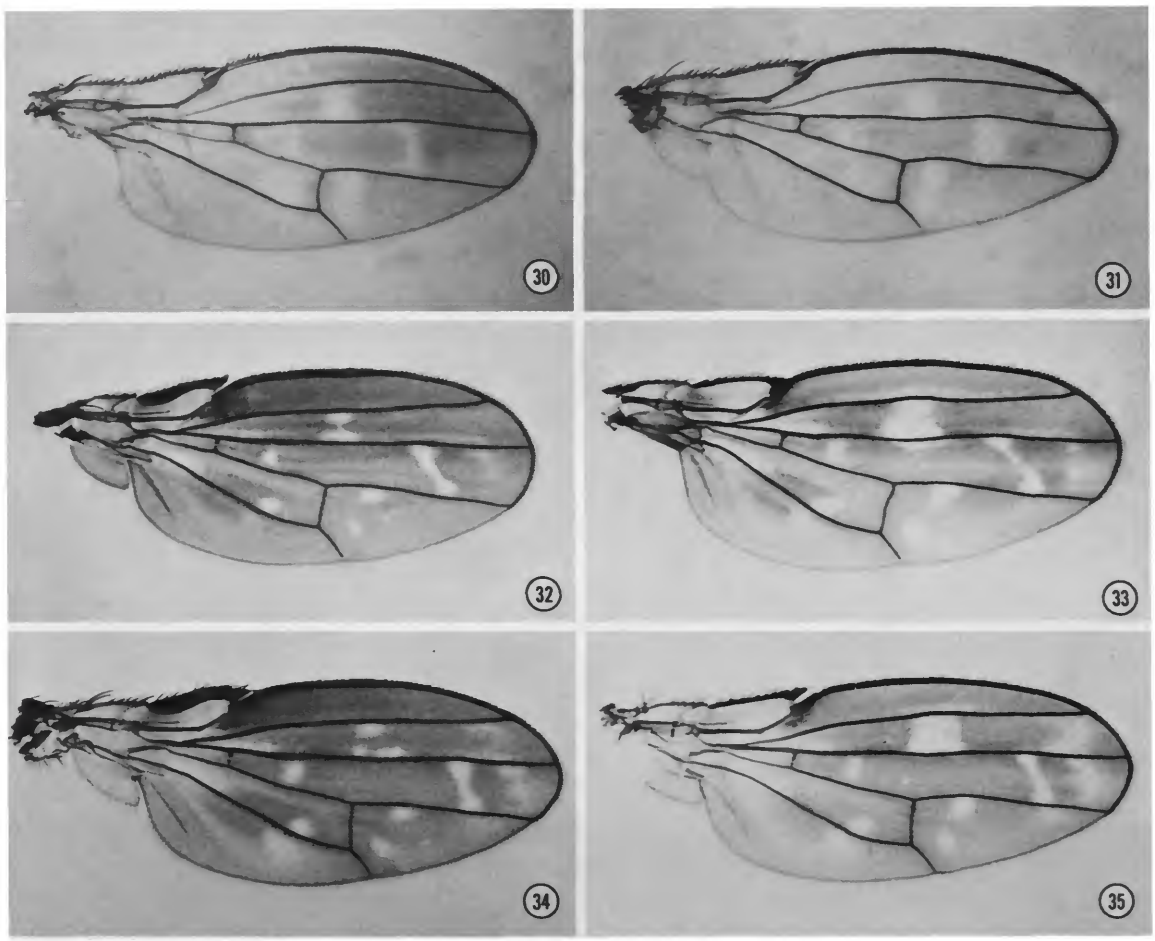
ures 34–35); wing of male differing as follows: Costa thickened, especially first costal section; infuscation darker brown; light areas in middle of cell R_3 as 2–3 semiseparate areas, attenuated medially to completely separate, not forming a large quadrate area; otherwise wing similar to that of female as described in diagnosis.

Abdomen: Mostly gray, but with considerable brownish coloration; anterior margin of each terga tending to be more brownish, considerably so in some specimens, other specimens with a distinct to less distinct dorsomedian brownish area, lateral margins of terga usually with some brownish coloration.

TYPE MATERIAL.—Holotype male is labeled: "Thomas Riv estuary Esperance Distr WA 7 Nov. 1977 D. H. Colless (At Light)/HOLOTYPE Scatella (Neoscatella) norrisi Mathis and Wirth [handwritten, red]." Allotype female and five paratypes (1♂, 4♀), have the same label data as the holotype. Other paratypes as follows: WESTERN AUSTRALIA: MIMMIGARRA STN., 23 Oct 1941, K. R. Norris, (1♂, 2♀; ANIC). The holotype, allotype, and most of the paratypes are in the Australian National Insect Collection, Canberra. A male and female paratype are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. The holotype specimen is double mounted (minute nadel in polyporus block) and is in excellent condition.

GEOGRAPHIC DISTRIBUTION (Figure 36).—South-central coast of Western Australia.

ETYMOLOGY.—The species epithet *norrisi* is a genitive patronym to honor Dr. K. R. Norris,



FIGURES 30–35.—Wings: 30, *S. immaculata*, male; 31, *S. immaculata*, female; 32, *S. austrina*, male; 33, *S. austrina*, female; 34, *S. norrisi*, male; 35, *S. norrisi*, female.

CSIRO, Canberra, Australia.

REMARKS.—Because the frontal pollinosity laterad of the ocellar triangle is so sparse, the species is keyed both ways in couplet one of our key.

The *austrina* Group

SPECIES INCLUDED.—*Scatella* (*Neoscatella*) *austrina*, new species; *S.* (*N.*) *vittithorax* Malloch; *S.* (*N.*) *victoria* (Cresson); *S.* (*N.*) *insularis*, new species.

DIAGNOSIS.—Specimens of this species-group may be distinguished by the following combination of character states: setae generally well developed and more or less abundant; generally pollinose with extensive areas sparsely pollinose to bare; frons pollinose except around ocellar triangle, especially laterad, appearing bare, shiny; 2 facial setae very evident, with 3–4 large, porrect facial setae very evident, with 3–4 large, porrect to slightly upcurved setae aligned between interfoveal carina and posteroventral angle of face; tarsi mostly concolorous with tibiae, blackish; fused surstyli and ventral margin of epandrium conspicuously setose, setae large and dark.

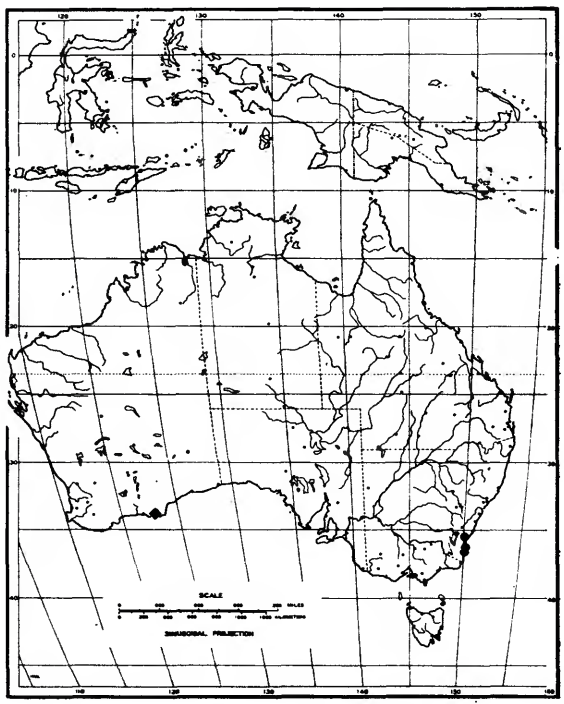


FIGURE 36.—Distribution map of *S. norrisi* (diamond) and *S. austrina* (circles).

DISCUSSION.—This species-group exhibits more features that are similar to the generalized condition of the genus; thus we are considering it to represent the plesiotypic condition for these characters.

6. *Scatella (Neoscatella) austrina*, new species

FIGURES 32–33, 36–38

DIAGNOSIS.—Specimens of this species are similar to those of *S. norrisi* but may be distinguished from them and other congeners by the following combination of character states: mesofrons more sparsely pollinose than parafrons or fronto-orbits, particularly laterad of ocellar triangle, appearing subshiny to shiny; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of second or third antennal segment; coloration of face in both sexes similar, mostly unicolorous, light yellowish to yellowish brown; marginal facial setae distinctly larger than those along median surface, with two to three pair of large, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; orientation of eye at slight oblique angle to oral margin; scutum and scutellum bicolored, mostly brown to dark brown, but with considerable gray to slightly greenish or bluish gray coloration, lacking a distinct median stripe; setae of front coxa and femur similar in both sexes; tarsi blackish brown, concolorous with tibiae and femora; brownish coloration of male wing darker than female wing; first costal section of male wing thickened, becoming slightly narrower apically; larger white area in cell R_3 subquadrate to slightly attenuated medially in female wing, in male wing weakly developed, narrower and attenuated medially, appearing more or less as 2 spots; apical white area in cell R_5 narrowly rectangular in both sexes, oriented at distinctly oblique angle to bordering veins on posterior and anterior margins.

DESCRIPTION.—Small to moderately small shore flies, length 1.87 to 2.46 mm; mostly brown, but with considerable gray to faintly bluish gray coloration; pollinose to sparsely pollinose, some areas subshiny to shiny.

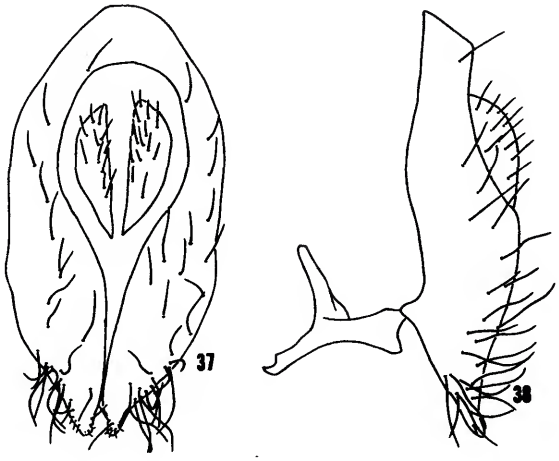
Head: Head width-to-height ratio averaging 1 : 0.68; frons mostly sparsely pollinose, area immediately laterad of ocellar triangle sparsely pollinose to nearly bare, subshiny to shiny; mesofrons separated from parafrons by membranous appearing, dark gray wedges extending posteriorly from anterior margin; ocellar triangle distinctly pollinose, brown; mesofrons brown anteriorly, becoming shiny, metallic mostly black posteriorly, some specimens with faintly greenish, thin strip anteromedially; lateroclinate fronto-orbital bristles subequal in length. Antenna with first and second segments blackish, third segment appearing grayish black due to pubescent vestiture; third segment subequal in length or slightly longer than combined length of first and second segments; arista with small hairlike setae above, these generally inconspicuous, appearing mostly

bare; distance between antennal bases short, less than length of third segment. Face with distinct interfoveal carina, appearing distinctly setose, especially marginal setae, with 3–4 larger setae aligned between interfoveal carina and posteroventral angle of face; face mostly grayish brown, slightly darker dorsally. Eye nearly round, eye width-to-height ratio averaging 1 : 1; gena moderately high, eye-to-cheek ratio averaging 1 : 0.31; gena more whitish gray than face, but becoming darker posteriorly. Clypeus mostly concealed.

Thorax: Mostly sparsely pollinose, brown, but with several grayish to faintly bluish or greenish gray areas, especially humeral callus, a spot just anterior of transverse suture, and a short stripe anterior and just laterad of larger acrostichal setae; mesopleuron and anterior portion of pteropleuron mostly brown, otherwise pleural areas becoming gradually brownish gray to gray ventrally and posteriorly. Legs concolorous, mostly dark; femora grayish brown with some blackish tinges; tibiae entirely brownish black; tarsi mostly blackish. Wings (Figures 32–33) sexually dimorphic; male wing differing as follows: costa thickened, especially the first costal section; infuscation darker brown; whitish area of cell R_3 as 2 spots either narrowly connected or completely separated; otherwise similar to female wing a described in diagnosis.

Abdomen: Dorsum of female specimens mostly gray, but with some linear brown areas medially and laterally; males with terga 1–4 mostly gray, but with anterior margins brown, brownish area becoming wider laterally, fifth tergum mostly brown. Male terminalia (Figures 37–38) as follows: as in generic description, but conspicuously setose, especially toward ventral apices (fused surstyli).

TYPE MATERIAL.—Holotype male is labeled: "Potato Point, 9.5 km E. of Bodalla, NSW 20 July, 1973 Z. Liepa/ HOLOTYPE Scatella (Neoscatella) austrina Mathis and Wirth [handwritten, red]." Allotype female and 26 paratypes (16♂, 10♀), have the same label data as the holotype. Other paratypes as follows: NEW SOUTH WALES: COILA LAKE, Tuross Hds., 19 Jul 1973, Z. Liepa (11♂, 22♀;. ANIC, USNM); LAKE CURALO, Eden (nr. sandbar), 3 Aug 1973, Z. Liepa (23♂, 15♀; ANIC, USNM); LAKE MUMMUGA, Dalmeny, 20 Jul 1973, Z. Liepa (1♀; ANIC); MORUYA RIVER, 19 Jul 1973, Z. Liepa (1♂, 1♀; ANIC); WALLAGA LAKE, Bermagui, 21 Jul 1973; Z. Liepa (1♂, 4♀; ANIC). VICTORIA: LAKE TYERS (inlet, nr. sandbar), 5 Aug 1973, Z. Liepa (11♂, 1♀; ANIC, USNM). The holotype and most of the paratopotypes are in the Australian National Insect Collection, Canberra. The holotype specimen is double mounted (minute nadel in polyporus block) and is in excellent condition.



FIGURES 37–38.—*S. austrina:* 37, epandrium, cerci, and fused surstyli, posterior aspect; 38, epandrium, cercus, fused surstylus, and gonite, lateral aspect.

GEOGRAPHIC DISTRIBUTION (Figure 36).—Southern coast of New South Wales.

ETYMOLOGY.—The species epithet *austrina* is of Latin derivation and means southern, referring to the southern hemisphere distribution of this species.

7. *Scatella (Neoscatella) vittithorax* Malloch

FIGURES 39–42

Scatella vittithorax Malloch, 1925:331.
Neoscatella vittithorax.—Cresson, 1935:360.

DIAGNOSIS.—Specimens of this species are similar to those of *S. victoria* but may be distinguished from them and other congeners by the following combination of character states: mesofrons more sparsely pollinose than parafrons or fronto-orbits,

particularly laterad of ocellar triangle, appearing subshiny to shiny; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of third antennal segment; facial coloration grayish yellow, slightly darker dorsally; marginal facial setae distinctly larger than those along median surface, with 2 –3 pairs of large, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; orientation of eye at very slight oblique angle to plane of oral margin; coloration of scutum and scutellum more or less concolorous, brown, with two partial grayish stripes anteriorly along acrostichal track extending posteriorly no more than half length of scutum; scutum lacking distinct median strips of differing color; setae of front coxa and femur similar to both sexes; tarsi dark brown, concolorous with femora and tibiae; brownish coloration of male wing slightly darker than female wing; pattern of white areas similar in both sexes; white area in cell R_3 subquadrate (female) to subrectangular (male), extending across width of cell; apical white spot in cell R_5 narrowly rectangular, aligned perpendicular to plane of veins on posterior and anterior border.

DESCRIPTION.—Small to moderately small shore flies, length 1.91 to 2.72 mm; mostly brown, but with some grayish brown coloration; mostly pollinose, some areas more sparsely so, appearing subshiny.

Head: Head width-to-height ratio averaging 1 : 0.62; frons pollinose to nearly bare; mesofrons nearly bare, subshiny to shiny laterad of ocellar triangle, becoming more pollinose anteriorly; mesofrons separated from parafrons by membranous appearing, greenish charcoalish gray wedge extending posteriorly from anterior margin; ocellar triangle distinctly pollinose, brown; lateroclinate fronto-orbital bristles subequal in length. Antenna dark colored; first and second segments mostly blackish; third segment blackish brown, with more pubescent vestiture; arista with small, hairlike setae, generally inconspicuous; length of third segment subequal or slightly longer than combined length of first and second segments; distance between antennal bases short, less than length of third segment. Face with distinct interfoveal carina, lacking dorsomedian short sulcus; mostly unicolorous, yellowish brown to light brownish gray, darker dorsally; facial setae conspicuous, especially those along margins, with 3–4 larger porrect to slightly upcurved setae aligned between interfoveal carina and posteroventral angle of face. Eye nearly round, eye width-to-height ratio averaging 1 : 1; oriented nearly perpendicular to plane of epistomal margin. Gena moderately low; eye-to-cheek ratio averaging 1 : 0.21; genal coloration more grayish with some faint greenish or bluish tinges, becoming darker, more brownish posteriorly. Clypeus generally concealed.

Thorax (Figure 39): General coloration mostly brown, but with some grayish to grayish brown areas. Mesonotum mostly entirely brown, extreme anterior margin grayish to bluish gray, extending onto humeral callus and just laterad of the acrostichal track in 2 short stripes; pleural areas mostly brown, becoming grayer posteriorly and ventrally. Legs concolorous; femora mostly grayish to charcoalish gray; tibiae mostly grayish charcoal; tarsi blackish. Wing of both sexes similar (Figures 41–42), see description in diagnosis.

Abdomen: Bicolored; anterior margins in dorsomedian area in some specimens brownish; posterior margins of terga mostly gray; fifth tergum of male almost entirely brownish.

TYPE MATERIAL.—Holotype female is labeled: "Sydney 6·10·24 [6 Sep 1924] Health Dept./Scatella vittithorax Type Det J R Malloch [black subborder; species name and word "Type" handwritten]." The holotype is in the School of Public Health and Tropical Medicine, University of Sydney, Sydney, New South Wales. One of the female paratypes is in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. The holotype is double mounted (minute nadel in polyporus block) and is in good condition.

OTHER SPECIMENS EXAMINED.—AUSTRALIA. NEW SOUTH WALES: Careel Bay, Casuarine, 27 Oct 1962, D. K. McAlpine (1♂; AM); Careel Bay, Avalon, Mangroves, 27 Oct 1962, D. K. McAlpine (1♀; AM); Engadine, nr. Sydney, 14 Sep 1977, G. Daniels (1♂; AM); Killara, 16 May 1936, M. F. Pay (1?; ANIC); Katoomba, 8 Nov–20 Dec 1958, G. H. Hardy (5♀; AM, USNM); Obelisk Bay, 12 Oct 1948, D.

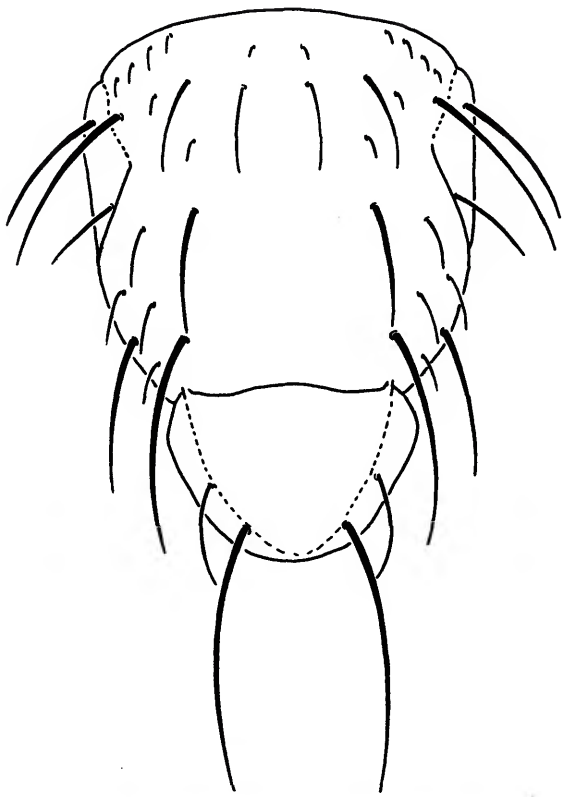


FIGURE 39.—*S. vittithorax:* 39, thorax, dorsal aspect.

J. Lee (2♀; SPHTM, USNM); Queanbeyan, 3 Nov 1942, Howlett (6♀; ANIC); Warriewood Beach, 28 Aug 1956, W. W. Wirth (1♀; USNM); Sleaford Bay, 1 Dec 1960, J. Casanova (1?; ANIC); Sydney, 1 Nov 1925 (1♀; SPHTM).

GEOGRAPHIC DISTRIBUTION (Figure 40).—Southern coast of New South Wales.

8. *Scatella (Neoscatella) victoria* (Cresson), new combination

FIGURES 40, 45

Neoscatella victoria Cresson, 1935:360.

DIAGNOSIS.—Specimens of this species are similar to those of *S. vittithorax* and *S. insularis* but may be distinguished from them and other congeners by the following combination of character states (male unknown): mesofrons more sparsely pollinose than parafrons or fronto-orbits, particularly laterad of ocellar triangle, appearing subshiny to shiny; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of third antennal segment; facial coloration grayish yellow to brown, slightly darker dorsally around interfoveal hump; marginal facial setae distinctly larger than those along median surface, with 2–3 pairs of larger, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; orientation of eye at very slight oblique angle to plane of oral margin; scutum and scutellum more or less concolorous, brown but with 2 grayish stripes anteriorly along acrostichal track extending posteriorly no more than half length of scutum; scutum lacking distinct median stripe; setae of front coxa and femur undifferentiated; tarsi dark brown, nearly con-

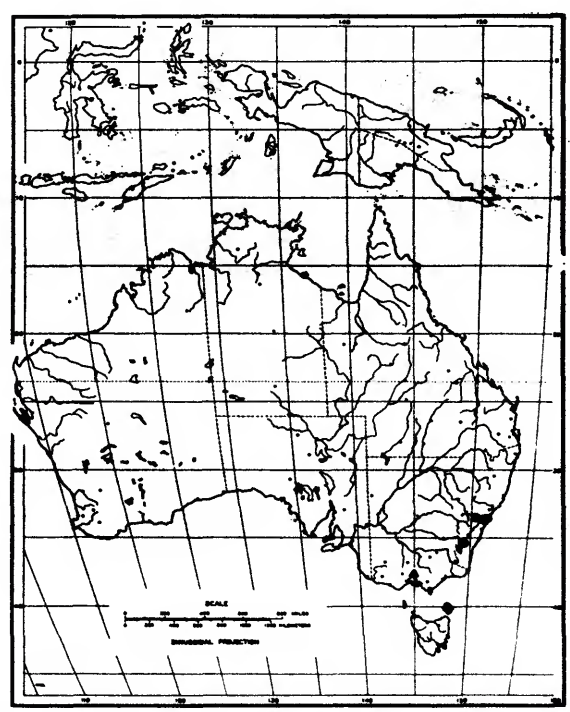


FIGURE 40.—Distribution map of *S. vittithorax* (circles), *S. insularis* (diamond), and *S. victoria* (triangle).

colorous with femora and tibiae; female wing uniformly infuscated, brown, except for white areas; cell R_3 with 2 distinct white areas, basal one narrowed medially, expanding basally to subequal length, apical spot not reaching vein R_{2+3}; discal cell with 1 subbasal white spot; cell R_5 with 4 subequal white spots, one basad of level of posterior crossvein, 2 aligned and apicad of posterior crossvein, same distance as basal spot, apical spot centered in membrane; discal cell with 1 posterodistal spot; cell M_2 with 3 spots, 2 aligned basally, apical one appressed against vein M_{1+2}; cell M_4 with 1 white spot more or less aligned with basal spot in cell R_5.

DESCRIPTION (based on female holotype).—A moderately small shore fly, length 2.34 mm; mostly brown, but with some grayish or grayish brown areas; pollinose to sparsely pollinose, some areas shiny.

Head: Head width-to-height ratio 1 : 0.64 frons pollinose laterally becoming bare around ocellar triangle, latter area shiny with metallic luster; mesofrons separated from parafrons by membranous appearing, dull greenish charcoalish gray wedge extending posteriorly from anterior margin; ocellar triangle distinctly pollinose, brown; lateroclinate fronto-orbital bristles subequal in length. Antenna with first and second segments mostly blackish; third segment brownish black, paler basally, slightly yellowish, more pubescent; length of third segment subequal or longer than combined length of first and second segments; arista appearing bare, with short, sparse, mostly inconspicuous setae; distance between antennal bases short, less than length of third segment. Face with distinct interfoveal carina and lacking dorsomedian short sulcus; facial setae conspicuous, especially those along margins; with 3–4 longer porrect to slightly upcurved setae aligned between interfoveal carina and posteroventral angle of face; face mostly yellowish brown, slightly darker dorsally and posterolaterally. Eye nearly round, eye width-to-height ratio 1 : 1.1. Gena moderately low, eye-to-cheek ratio 1 : 0.20; genal coloration lighter than face, more grayish to faintly bluish gray, becoming darker posteriorly. Clypeus generally concealed.

Thorax: Mostly brown, becoming more conspicuously brown on scutellum; extreme anterior margin grayer, gray coloration extending into humeral callus. Pleural areas brown to yellowish brown dorsally, becoming grayer posteriorly and ventrally. Legs concolorous, femora gray to blackish brown, becoming darker apically; tibiae mostly blackish; tarsi blackish. Wing (Figure 45) as described in diagnosis.

Abdomen: Terga bicolored, anterior margins brownish, brownish coloration becoming wider laterally; posterior margin mostly gray to faintly bluish gray.

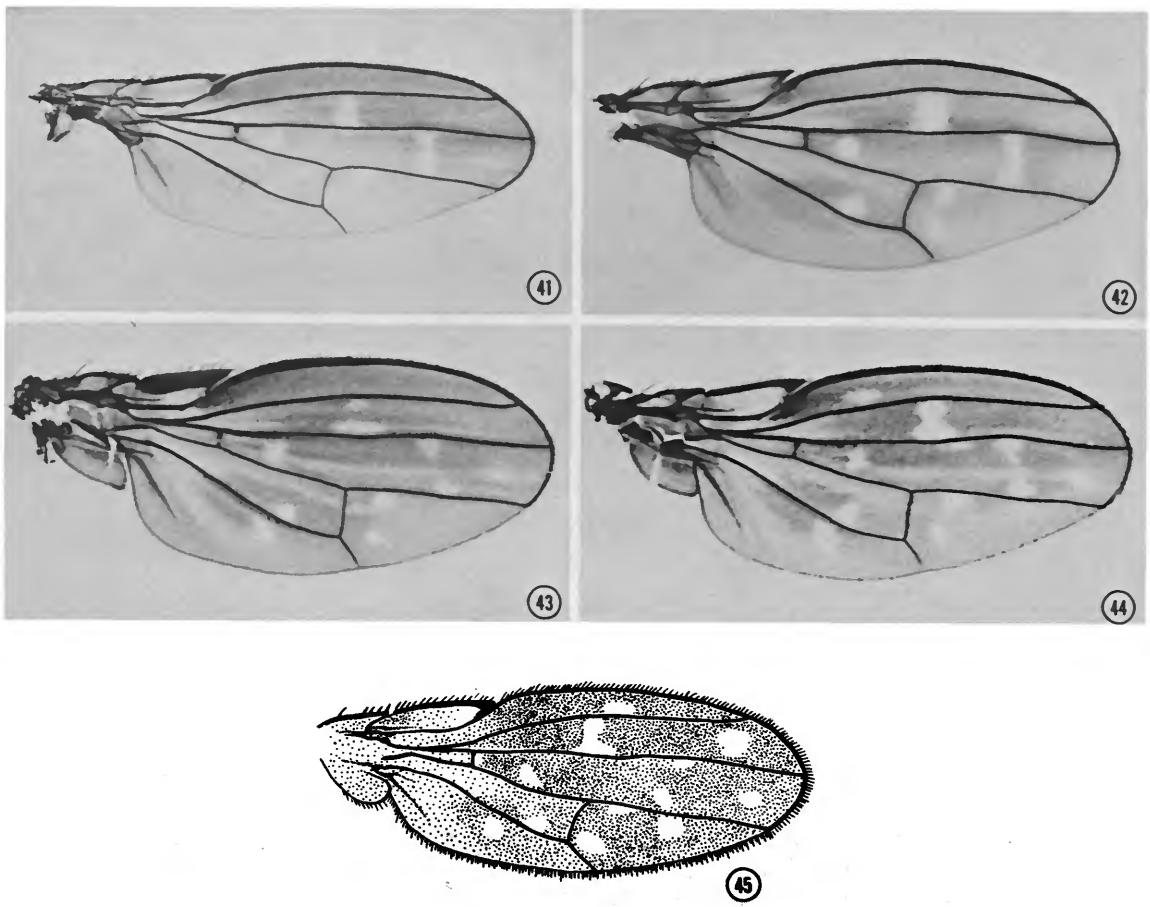
TYPE MATERIAL.—Female holotype is labeled: "Victoria 1888 [hand-written]/♀ [yellow]/TYPE No. Neoscatella VICTORIA 6514 E T Cresson, Jr. [red]." The holotype and 1 female paratopotype are in the Academy of Natural Sciences of Philadelphia, type number 6514. The holotype is double mounted (minute nadel in dark base) and is in fair condition. The left wing is missing, and the right one is slightly tattered.

GEOGRAPHIC DISTRIBUTION (Figure 40).—Known only from the type-locality, "Victoria" (probably near Melbourne).

9. *Scatella (Neoscatella) insularis*, new species

FIGURES 40, 43–44, 46

DIAGNOSIS.—Specimens of this species are similar to those of *S. victoria* but may be distinguished from them and other congeners by the following combination of character states: mesofrons more thinly pollinose than parafrons or fronto-orbits, particularly laterad of ocellar triangle, appearing subshiny to shiny; lateroclinate fronto-orbital bristles subequal in length; dorsum of interfoveal carina narrowly developed; distance between antennal bases about equal to length of third antennal segment; facial coloration grayish yellow to light brown, slightly darker dorsally along interfoveal crease; marginal facial setae distinctly larger than those along median surface, with 2–3 pairs of larger, slightly dorsally curved setae aligned between interfoveal carina and posteroventral corner of face; setae along oral margin of



FIGURES 41–45.—Wings: 41, *S. vittithorax*, male; 42, *S. vittithorax*, female; 43, *S. insularis*, male; 44, *S. insularis*, female; 45, *S. victoria*, female.

male specimens becoming longer and more dense toward median; scutum and scutellum more or less concolorous, mostly brown to dark brown, pollinose to subshiny, but with gray to lightly bluish or greenish gray areas, especially anteriorly and laterally, lacking a distinct median stripe; setae of front coxa and femur undifferentiated; tarsi dark brown, nearly concolorous with femora and tibiae; wing of male slightly darker brown than female wing and size of white spots smaller; first costal section of male wing uniformly thickened; white spot(s) of cell R_3 attenuated medially, completely so in male; 2 apical white spots in cell R_5 of both sexes, sometimes with very slender connection, oriented at slightly oblique angle to bordering anterior and posterior veins; female wing sometimes with white spot in cell R_1, if present usually weak.

DESCRIPTION.—Moderately small to medium sized shore flies, length 2.32 to 3.08 mm; mostly brown, but with some yellowish brown to grayish brown areas; pollinose to nearly bare, subshiny.

Head: Head width-to-height ratio averaging 1 : 0.61; frons pollinose laterally and anteriorly;

mesofrons bare, shiny laterad of ocellar triangle, otherwise pollinose, brown to faintly greenish brown; parafrons separated from mesofrons by membranous appearing, darker, wedge extending posteriorly from anterior margin; ocellar triangle slightly darker brown, pollinose; lateroclinate fronto-orbital bristles subequal in length. Antenna with first and second segments mostly blackish; third segment mostly blackish, slightly more brownish posteroventrally; third segment more pubescent, length subequal or slightly longer than combined length of first and second segments; arista appearing mostly bare, setae small, sparse, inconspicuous; distance between antennal bases short, less than length of third segment. Face with distinct interfoveal carina; facial setae large, conspicuous, especially those along margins; with 3–4 larger porrect to slightly upcurved setae aligned between interfoveal carina and posteroventral angle of face; male with setae along oral margin longer and denser, especially toward median, than same setae of female; face mostly unicolorous grayish to tannish yellow. Eye nearly round, eye width-to-height ratio averaging 1 : 1.1. Gena moderately high, eye-to-cheek ratio averaging 1 : 0.28; gena lighter in color than face, grayer, becoming darker posteriorly. Clypeus generally concealed.

Thorax (Figure 46): Mostly sparsely pollinose, brown along setal tracks, otherwise with considerable faint greenish gray to greenish brown coloration, coloration pattern vittate; humeral callus and notopleuron mostly gray; pleural areas brown to golden brown dorsally, becoming grayer ventrally and posteriorly. Legs concolorous; femora grayish black, but with considerable faint greenish to bluish coloration; tibiae mostly blackish; tarsi black. Wings sexually dimorphic (Figures 43–44); male wing differing as follows: costa thickened, especially first costal section; infuscation slightly darker; white areas not as extensive, especially in cell R_3 and R_1.

Abdomen: Bicolored; anteromedian and anterolateral areas of each terga brownish, posterior surfaces grayish with some faint greenish to bluish tinges; male fifth tergum mostly brown.

TYPE MATERIAL.—Holotype male is labeled: "Fisher Island. 20. Dec. 1952. R. Mykytowycz/CSIRO [yellow]/ HOLOTYPE Scatella (Neoscatella) insularis Mathis and Wirth [handwritten, red]." Allotype female and three paratypes (2♂, 1♀): LITTLE DOG ISLAND, 23 Dec 1952, R. Mykytowycz. The holotype is in the Australian National Insect Collection, Canberra. A male and female paratype are in the National Museum of Natural History, Smithsonian Institution, Washington, D. C. The holotype specimen is double mounted (minute nadel in polyporus block) and is in excellent condition. The right wing has been removed and slide mounted.

GEOGRAPHIC DISTRIBUTION (Figure 40).—Two islands (Little Dog and Fisher) between the northeast coast of Tasmania and southeastern Australia.

ETYMOLOGY.—The species epithet *insularis* is of Latin derivation and means "of an island," referring to the island habitat of specimens of this species.

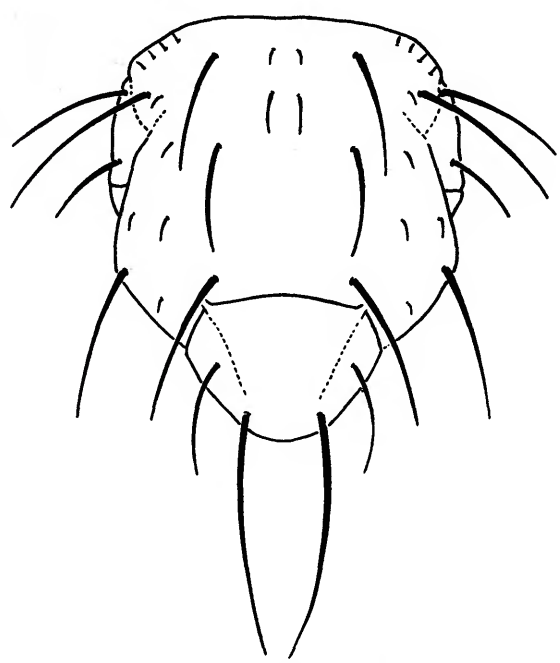


FIGURE 46.—*S. insularis:* 46, thorax, dorsal aspect.

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