

REVISION OF THE *ORNATUS* SPECIES GROUP OF THE GENUS
ANTHONOMUS GERMAR (COLEOPTERA: CURCULIONIDAE)

WAYNE E. CLARK AND HORACE R. BURKE

(WEC) Department of Entomology and Alabama Agricultural Experiment Station, Auburn University, Alabama 36849; (HRB) Department of Entomology, Texas A&M University, College Station, Texas 77843.

Abstract.—The seven species in the *Anthonomus ornatus* species group are *A. ornatus* Blanchard, *A. signatipennis* Blanchard, *A. chilicola* Clark, new species, *A. kuscheli* Clark, new species, *A. araucanus* Clark, new species, *A. blanchardi* Clark, new species, and *A. berberidis* Clark, new species. These are hypothesized to constitute a monophyletic group on the basis of morphological characters of the adult weevils, their common association with plants in the genus *Berberis* (Berberidaceae) and their restricted distributions in southern Chile and Argentina. Other characters determined to be apomorphic by comparisons with other anthonomines were used to produce a phylogeny of the species in the *A. ornatus* group. Characters diagnostic of the group and of each of the species are presented, along with illustrations and a key to adults of the species. The larval and pupal stages of *A. ornatus* and *A. kuscheli* are also described and illustrated.

Key Words: *Anthonomus*, Anthonominae, PAUP, phylogeny, *Berberis*, Chile, Argentina

The *Anthonomus ornatus* group includes *A. ornatus* Blanchard, *A. signatipennis* Blanchard, and five heretofore undescribed species. The species occur in southern Chile and Argentina at least as far south as Isla Navarino (55°S) in the Chilean province of Magallanes northward to the province of Coquimbo (30°S). Known hosts of the species are plants in the genus *Berberis* (Berberidaceae). The members of the *A. ornatus* group appear to be the only representatives of the subfamily Anthonominae in Chile. This fact is noteworthy because the anthonomines are rich and diverse in the remainder of the Neotropical Region (O'Brien and Wibmer 1982, Wibmer and O'Brien 1986). It seems likely that the sister group of the *A. ornatus* group will be found among the Nearctic or Neotropical species, but hypotheses of such relationships cannot be formulated until these species are more

completely known taxonomically. Meanwhile, the descriptions, illustrations and keys presented in this paper should facilitate identification of the species in the *A. ornatus* group.

MATERIALS AND METHODS

Specimens of 785 adults, including the types of the previously described species, were examined. These were from the collections of the following individuals and institutions (letter codens identify the collections in the text):

- AMNH The American Museum of Natural History, New York City, New York, USA (L. H. Herman, Jr.);
- CACA Collection of Allan C. Ashworth, Fargo, North Dakota, USA;
- CCBM Collection of C. Bordón, Maracay, Venezuela;

- CWOB Collection of C. W. O'Brien, Tallahassee, Florida, USA;
- HAHC Collection of H. and A. Howden, Ottawa, Ontario, Canada;
- MCZC Museum of Comparative Zoology, Cambridge, Massachusetts, USA (S. R. Shaw);
- MNHN Muséum National d'Histoire Naturelle, Paris, France (H. Perrin);
- MNNC Museo Nacional de Historia Natural, Santiago, Chile (M. Elgueta D.);
- MZSP Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (U. R. Martins);
- NZAC Division of Scientific and Industrial Research, Auckland, New Zealand (G. Kuschel);
- TAMU Texas A&M University, College Station, Texas, USA (H. R. Burke);
- USNM National Museum of Natural History, Washington, D.C., USA (D. R. Whitehead).

Measurements of adult specimens were made with an ocular micrometer in a dissecting microscope as follows: total length from anterior margin of eye to elytral apex in lateral view; width across elytra at widest point; length of pronotum, dorsally, from anterior to posterior margins; length of rostrum from anteroventral margin of eye to apex, across arc, in lateral view; length of distal portion of rostrum from antennal insertion to apex in lateral view; width of frons at narrowest point between eyes; width of base of rostrum just distad of eyes in dorsal view; and width of pro- and metafemora, in anterior view, excluding the ventral teeth. The range and, in parentheses, the mean and sample size of each measurement are given for each species.

Descriptions of larvae are based on full-grown specimens. The terminology follows Anderson (1947) and Thomas (1957). Where differences in terminology exist between the two systems, the Thomas terms are placed in parentheses following those of Anderson.

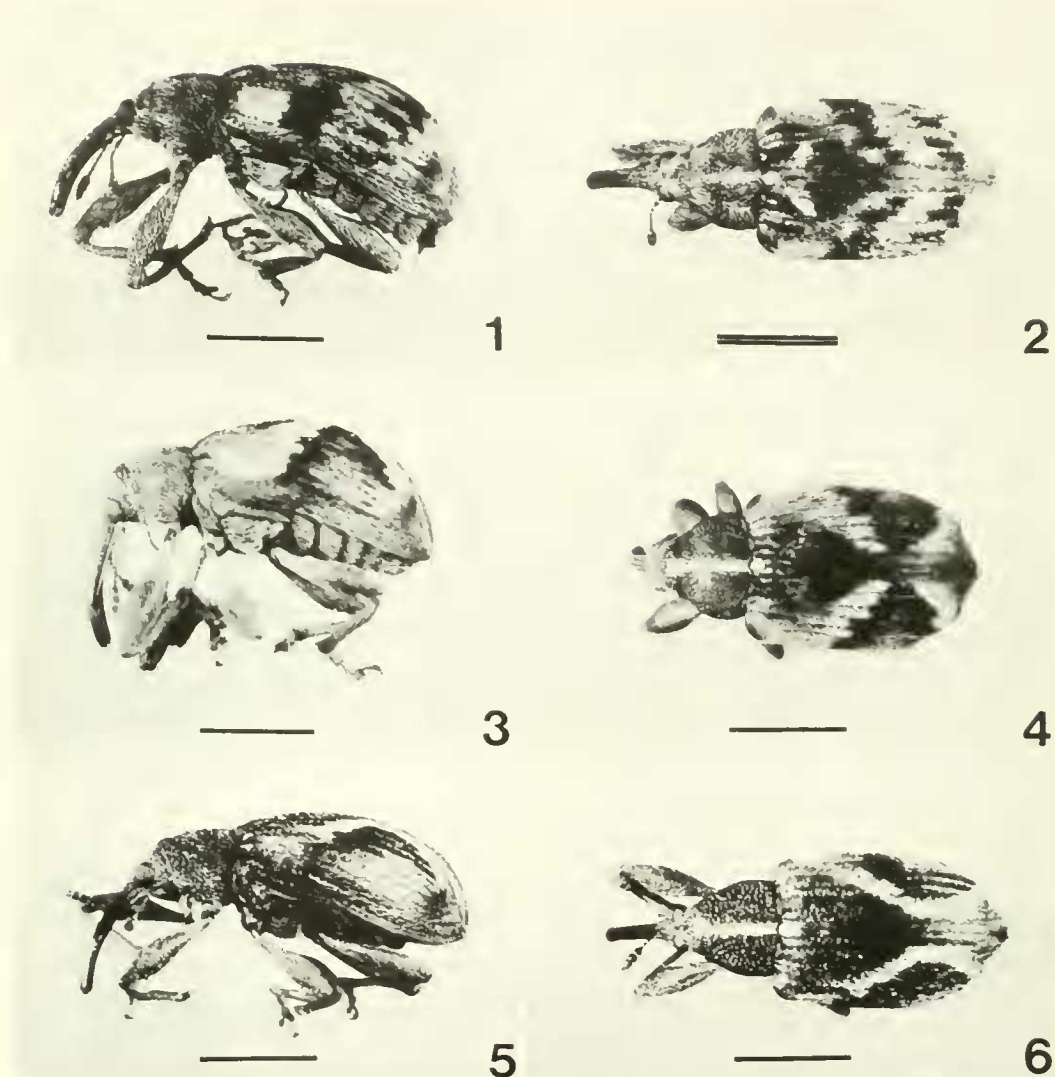
Terminology of pupal characters follows Burke (1968).

THE *ANTHONOMUS ORNATUS* GROUP

Adults of the seven species in the *A. ornatus* group are about average in size for the genus (specimens examined range from 1.88 to 4.00 mm in length), somewhat elongate and slender in body form, without significant elytral prominences, and with relatively slender profemora armed with a moderately large ventral tooth and a smaller, distal tooth. They are distinguished by their contrasting patterns of white, pallid to dark ferruginous and fuscous scales that cover corresponding areas of pallid or dark integument (Figs. 1–12). No other anthonomines examined have exactly this same pattern. Adults of the species also have an elongate, flat, distal endophallic sclerite (Figs. 19–30). They are further characterized as follows:

Head: vertex with narrow ferruginous scales, frons with broader, more pallid scales; eyes strongly convex, slightly to prominently elevated, separated by distance 0.6–0.9 × width of rostrum at base; antennal funiculus with 7 articles. *Rostrum:* slender; proximal portion with well-developed carinae and sulci; finely setose. *Prothorax:* pronotum densely, coarsely punctate, with narrow, attenuate, pallid to dark ferruginous scales and broader, more pallid scales in narrow middorsal vitta; pleuron with small anteromedian patch of pallid, broad scales that is feebly developed in small specimens. *Elytra:* humeri not prominent; sides subparallel. *Pygidium:* not impressed or sulcate. *Legs:* pro- and mesocoxae with dense, broad, pallid scales that are weakly developed in small specimens; profemur slender, ca. 1.1–1.2 × stouter than metafemur, with small, conical, acute ventral tooth and smaller distal tooth; metafemur with small ventral tooth and minute distal tooth; protibial uncus slender, slightly curved. *Genitalia:* male tegmen with long parameres.

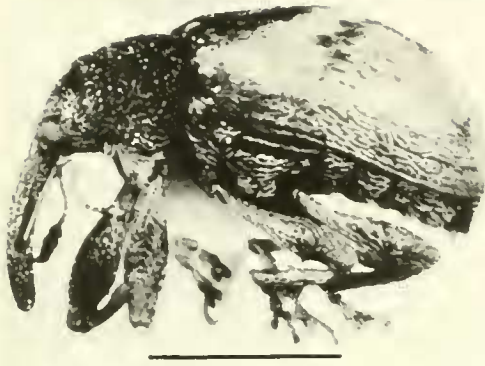
Distribution (Figs. 42–45). The species in the *A. ornatus* group are known mainly from



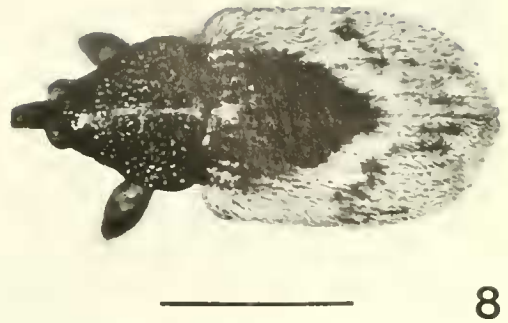
Figs. 1-6. Habitus of adults (lines represent 1 mm): 1) *A. signatipennis*, male, Quinta Pittet, Magallanes, Chile, lateral view; 2) the same, dorsal view; 3) *A. ornatus*, male, Río El Ganso, Seno de Otway, Magallanes, Chile, lateral view; 4) the same, dorsal view; 5) *A. kuscheli*, female, Chepu, Chiloé, Chile, lateral view; 6) the same, dorsal view.

the Valdivian and Magellanic forest regions which, according to Kuschel (1960), extend south of the 36th parallel beyond the southernmost portion of the continent to Isla Navarino at the 55th parallel. Blanchard (1851: 387) stated that both *A. signatipennis* and *A. ornatus* were found in "la provincia de Coquimbo." These records, along with records of *A. signatipennis* from the Chilean

provinces of Valparaíso and Santiago (Figs. 42, 43), extend the limits of the group significantly north of the Valdivian Forest into more arid regions. A possible explanation for this extension is found in the observation by Davis (1986) that in parts of the Coquimban Desert Province, moisture from coastal fog supports remnants of the Valdivian forest. Davis listed several southern



7



8



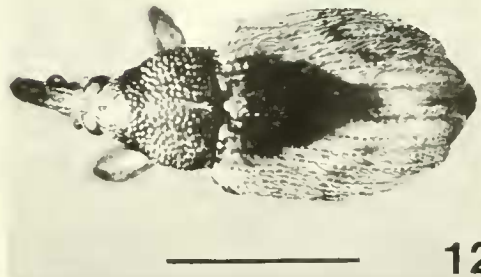
9



10



11



12

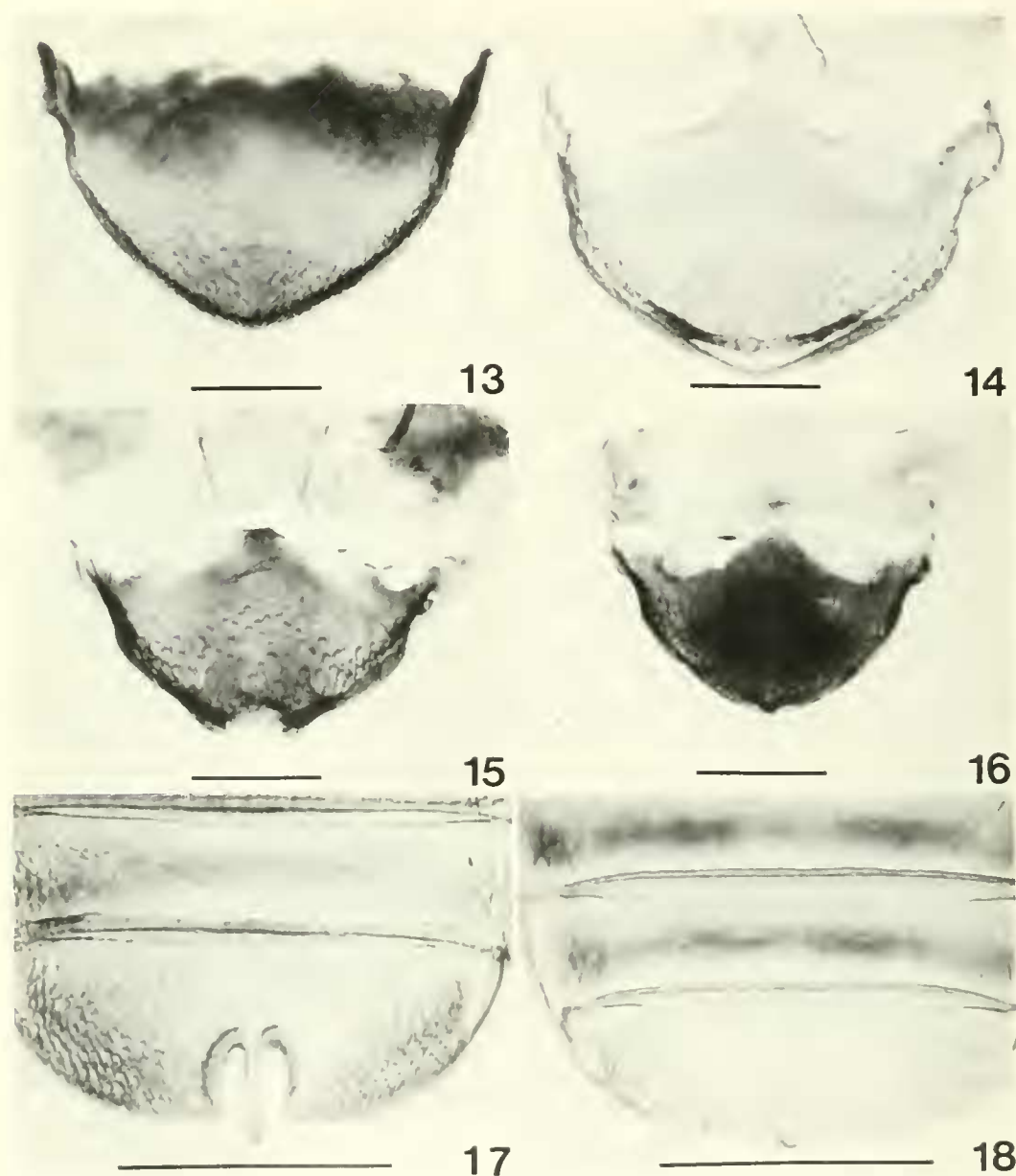
Figs. 7-12. Habitus of adults (lines represent 1 mm): 7) *A. araucanus*, male, Laguna Malleco, Malleco, Chile, lateral view; 8) the same, dorsal view; 9) *A. chilicola*, male, 20 km. E Manzanar, Malleco, Chile, lateral view; 10) the same, dorsal view; 11) *A. berberidis*, male, Frutillar, Llanquihue, Chile, lateral view; 12) the same, dorsal view.

temperate plant species (not including *Berberis*, the known hosts of the members of the *A. ornatus* group), as occurring in these moist refugia.

Plant associations. Six of the 7 species of the *A. ornatus* group are known to be associated with one or more of the following Berberidaceae: *Berberis buxifolia* Lamarck;

B. chilensis Hort. ex C. Koch; *B. darwini* Hooker; and *B. ilicifolia* Forster in Comm. The two species for which the immatures are known, *A. ornatus* and *A. kuscheli*, develop in flower buds. The site of development of the remaining species is not known.

Label data indicate that adults of *A. signatipennis* and *A. ornatus* have been col-

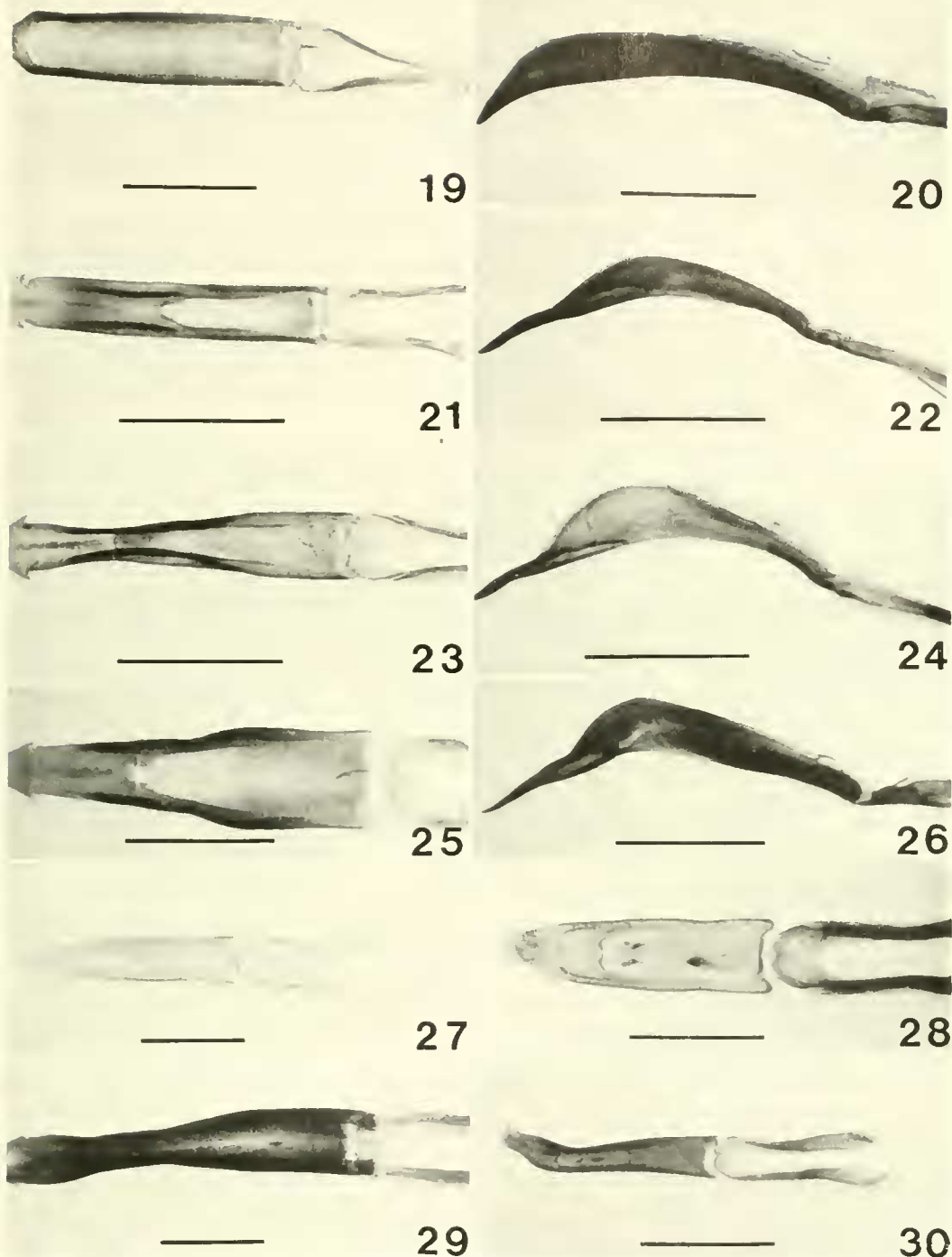


Figs. 13-16. Pygidium, adult female, dorsal view (line represents 0.25 mm): 13) *A. signatipennis*, Quinta Pittet, Magallanes, Chile; 14) *A. ornatus*, Lago Frio, Aisén, Chile; 15) *A. kuscheli*, Panquipulli, Valdivia, Chile; 16) *A. araucanus*, Laguna Laja, Bio-Bio, Chile.

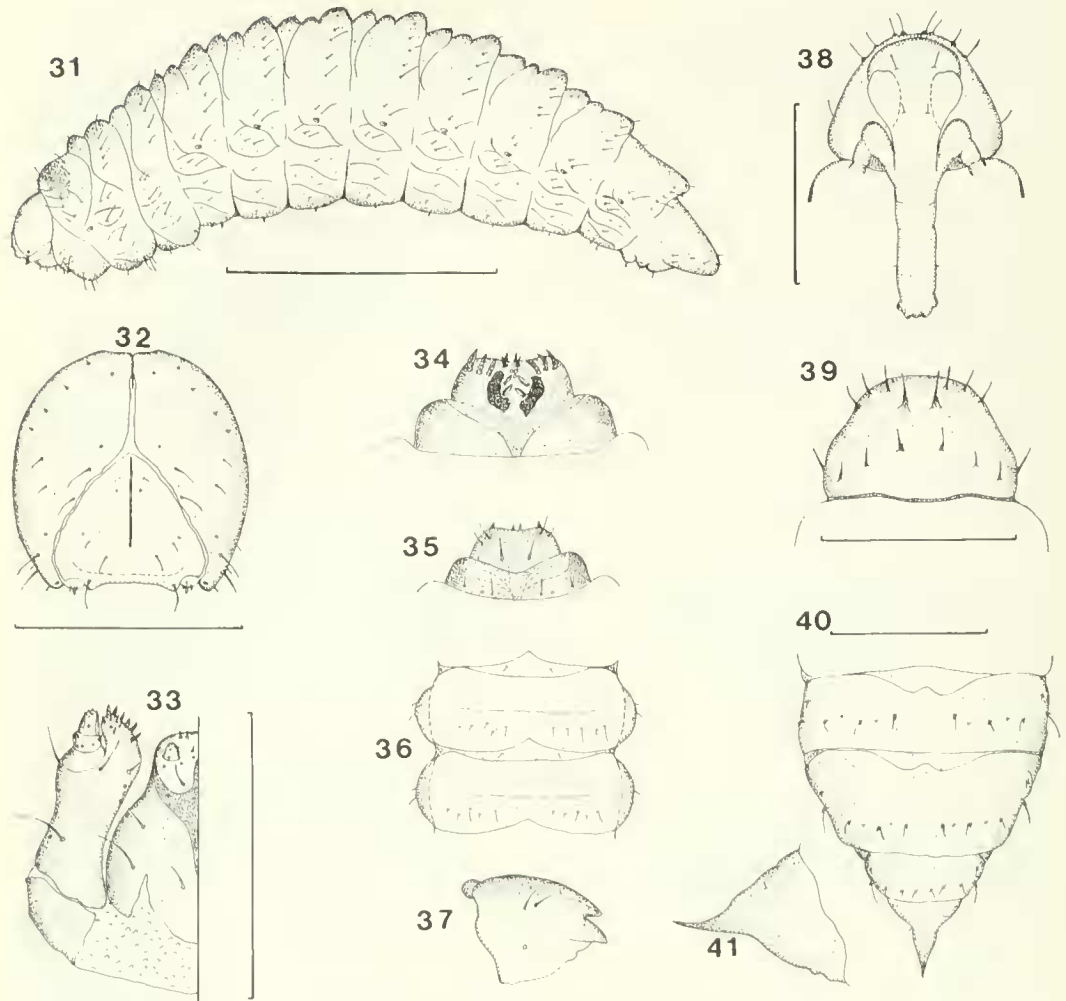
Figs. 17-18. Abdomen, adult female, ventral view (line represents 0.25 mm): 17) *A. ornatus*, Lago Frio, Aisén, Chile; 18) *A. blanchardi*, El Coigo, Curicó, Chile.

lected together, on the same date, at several localities. One of these records indicates that specimens of the two species were taken on the same day on *B. buxifolia*. Larvae of one of the species, *A. ornatus*, are known to de-

velop in flower buds, but the developmental site of *A. signatipennis* is unknown. Adults of the two species have also been taken at the same locality on *B. ilicifolia*, but one day apart. Adult *A. blanchardi* have been



Figs. 19-30. Aedeagus, adult male (line represents 0.5 mm): 19) *A. signatipennis*, Estancia Fenton, Magallanes, Chile, dorsal view; 20) the same, lateral view; 21) *A. ornatus*, Trapatrapa, Concepción, dorsal view; 22) the same, lateral view; 23) *A. ornatus*, Lago Frio, Aisén, dorsal view; 24) the same, lateral view; 25) *A. blanchardi*, El Coigo, Curicó, Chile, dorsal view; 26) the same, lateral view; 27) *A. kuscheli*, Pichinahuel, Malleco, Chile, dorsal view; 28) *A. araucanus*, 20 km. E Manzanar, Malleco, Chile, dorsal view; 29) *A. chilicola*, 20 km. E Manzanar, Malleco, Chile, dorsal view; 30) *A. berberidis*, Frutillar, Llanquihue, Chile, dorsal view.



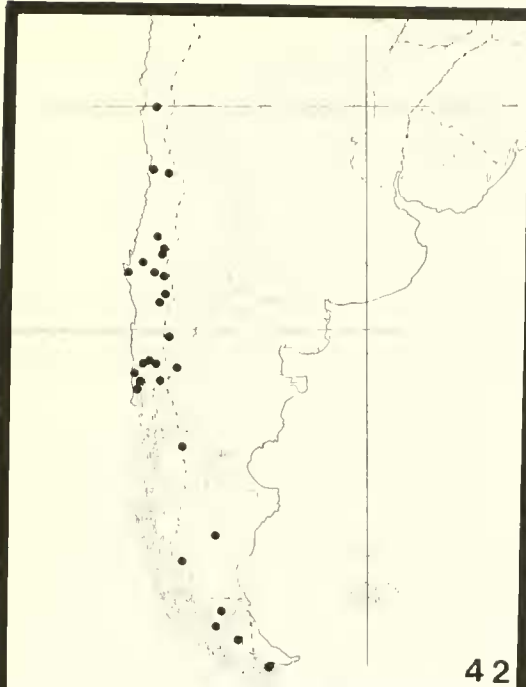
Figs. 31-37. Third instar larva of *Anthonomus kuscheli*. 31) lateral view; 32) head capsule, frontal view; 33) labium and right maxilla, ventral view; 34) epipharynx; 35) clypeus and labrum; 36) abdominal segments 3 and 4, dorsal view; 37) mandible. Line accompanying Fig. 31 = 2 mm; Fig. 32 = 0.5 mm; Fig. 33 = 0.25 mm; other figures greatly enlarged.

Figs. 38-41. Pupa of *Anthonomus ornatus*. 38) head, rostrum and ventral view of prothorax; 39) prothorax, dorsal view; 40) terminal abdominal segments, dorsal view; 41) 9th abdominal segment; lateral view. Line accompanying Fig. 38 = 1 mm; Fig. 39 = 1 mm; Fig. 40 = 0.5 mm.

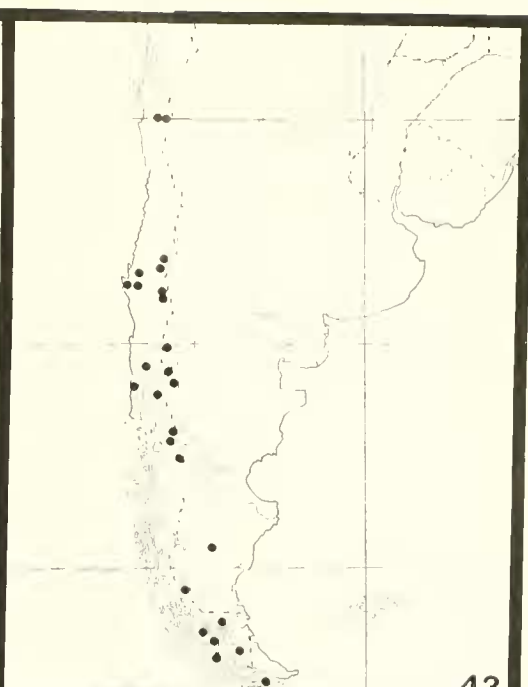
collected on *B. buxifolia*, but not at the same locality as *A. signatipennis* and *A. ornatus*. Adults of another pair of species, *A. kuscheli* and *A. berberidis*, have been collected on *B. darwini* at the same time and locality.

Discussion. No observed characters of adults of the members of the *A. ornatus* group can be cited with confidence as evidence of a sister group relationship with any anthonomine group (Clark 1987a, b, e, 1988,

Clark and Burke 1985, 1986a, b, c, Clark and Martins 1987). The larvae of two of the species, *A. ornatus* and *A. kuscheli*, are known. These larvae trace to *A. pomorum* L. and *A. nebulosus* LeConte in a key to larvae of members of the subfamily (Ahmad and Burke 1972), but there is no other indication that these species are very closely related. Larvae of *A. kuscheli* are distinct in possessing three rather than four epipharyn-



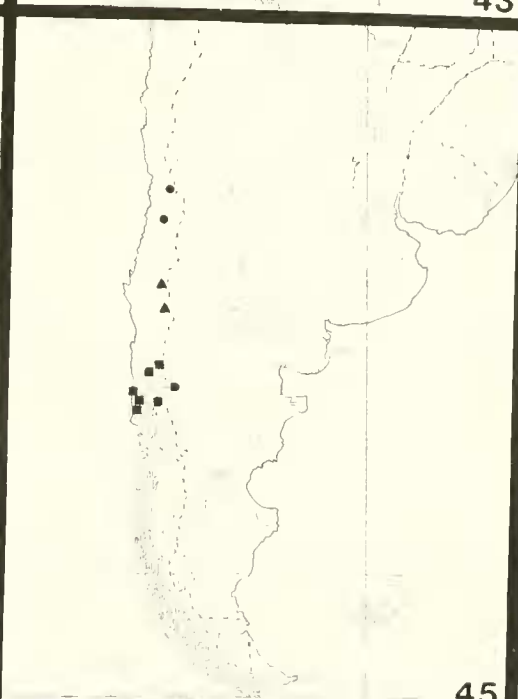
42



43



44



45

Fig. 42. Map of southern South America showing the distribution of *A. signatipennis*.

Fig. 43. Map of southern South America showing the distribution of *A. ornatus*.

Fig. 44. Map of southern South America showing the distributions of *A. kuscheli* (circles) and *A. chilicola* (square).

Fig. 45. Map of southern South America showing the distributions of *A. blanchardi* (circles), *A. araucanus* (triangles) and *A. berberidis* (squares).

geal sensory pores. Larvae of *Cocotorus scutellaris* (LeConte) are the only other anthonomines known to have only three epipharyngeal sensory pores, but available information does not indicate that this species is closely related to the *A. ornatus* group. The pupae of members of the *A. ornatus* group have a single process on the 9th abdominal segment. This structure, however, is also shared with several other, apparently unrelated anthonomines, including *Tachypterellus quadrigibbus* Say, *Pseudanthonomus validus* Dietz, *Anthonomus albopilosus* Dietz, *A. stupulosus* Champion, *A. griseisquamis* Champion, *A. unipustulatus* Champion and *A. nubiloides* Fall (Burke 1968).

The association of the species in the *A. ornatus* group with plants in the genus *Berberis* is biogeographically significant. Guillermo Kuschel (pers. comm.), speaking from years of experience collecting weevils and other insects in Chile and neighboring countries, noted that the *A. ornatus* group members were found exclusively on *Berberis*. He also insisted that he "frequently and quite thoroughly" checked *Berberis* plants all over northern Chile, Peru and Bolivia, but found no anthonomines on those plants there. The ± 500 species of *Berberis* are distributed throughout the north temperate zones and southward, mainly at higher altitudes, in tropical regions of Africa, Asia and South America (Cronquist 1981: 130, Good 1964: 80-81). As noted by Cabrera and Willink (1973: 98), species of *Berberis* are abundant in the Valdivian and Magellanic forests of southern Chile and adjacent portions of Argentina. Raven (1963: 155) listed *Berberis* among several genera that used the mountains to extend their distribution from the northern hemisphere to the south. No other anthonomines are known to have hosts in the family Berberidaceae (Burke [1976] listed plant families known to contain anthonomine hosts).

It is fairly certain that the members of the *A. ornatus* group are the only anthonomines to be found in Chile. No others are listed

by Wibmer and O'Brien (1986) in their checklist of South American Curculionidae. Schenkling and Marshall (1934) did list two other Chilean Curculionidae, *Anthonomus variabilis* Philipi and *A. australis* Philipi, as anthonomines, but Kuschel (1950: 17) determined that these are actually members of the genus *Rhopalomerus* Blanchard in the subfamily Eugnominae.

KEY TO ADULTS OF THE SPECIES OF ANTHONOMUS IN THE *A. ORNATUS* GROUP

1. Elytra (Figs. 1, 2) with oblique, alternating light and dark fasciae, without posterolateral maculae; elytral interstria 2 with discrete posteromedian pallid line bounded anteriorly and posteriorly by short, dark portions (Figs. 1, 2) *signatipennis*
- 1'. Elytra with large, posterolateral maculae (Figs. 3-6, 9, 10) (feebly developed in some specimens, Figs. 7, 8, 11, 12); elytral interstria 2 without discrete posteromedian pallid segment bounded anteriorly and posteriorly by short, dark portions 2
2. Sutural elytral interstriae with acute, overlapping apical extensions; metatibia of male with ventral margin strongly concave in distal $\frac{2}{3}$, with enlarged, excavated apical mucro; aedeagus asymmetrical (Figs. 29, 30) 3
- 2'. Sutural elytral interstriae without apical extensions; metatibia of male with ventral margin not or only slightly concave in distal $\frac{2}{3}$, apical mucro small; aedeagus symmetrical (Figs. 19-28) 4
3. Sternum 5 of male with large posteromedian prominence (Fig. 11); pallid annuli around posterolateral elytral maculae weakly developed (Fig. 12) *berberidis*
- 3'. Sternum 5 of male without posteromedian prominence; pallid annuli around posterolateral maculae distinct (Fig. 10) *chilicola*
4. Elytra with posterolateral maculae completely surrounded dorsally by pallid annuli (Figs. 5, 6); pygidium of female with subapical prominences (Fig. 15); body slender, somewhat flattened dorsally (Fig. 5) *kuscheli*
- 4'. Elytra with posterolateral maculae incompletely surrounded dorsally by pallid annuli (Figs. 3, 4), or macula feebly developed (Figs. 7, 8); pygidium of female with subapical prominences weakly developed (Fig. 14) or absent; body less slender, less flattened (Figs. 3, 7) ... 5
5. Elytral pattern distinct (Figs. 3, 4); sternum 5 of female with shallow emarginations (Fig. 18) or deep incisions (Fig. 17) on each side of me-

- dian prominence; aedeagus with apicolateral prominences (Figs. 21, 23, 25); pygidium of female without apicomedian prominence (Fig. 14) 6
- 5'. Elytral pattern weakly developed, except for prominent midbasal macula (Figs. 7, 8); sternum 5 of female without emarginations or incisions; apex of aedeagus narrowed to apex, without apicolateral projections (Fig. 28); pygidium of female with small apicomedian prominence (Fig. 16) *araucanus*
6. Sternum 5 of female with deep posteromedian incisions (Fig. 17); aedeagus (Figs. 21, 23) about as broad at broadly rounded apex as at base, with acutely pointed apicolateral prominences *ornatus*
- 6'. Sternum 5 of female (Fig. 18) with small, shallow emarginations on each side of small, blunt, posteromarginal prominence; aedeagus (Fig. 25) narrower at apex than at base, apex slightly distended, with blunt, weakly developed apicolateral prominences *blanchardi*

***Anthonomus signatipennis* Blanchard**

Figs. 1, 2, 13, 19, 20, 42

Anthonomus signatipennis Blanchard 1851: 387. **Holotype.** Chile, "provincia de Coquimbo," male, labelled with a green disc and [67/ 7] [TYPE] [MUSEUM PARIS/ CHILI/ CL. GAY 1849] [*Anthonomus/ signatipennis/ Type Blanchard/ H. Perrin det. 19*] (MNHN). Blackwelder 1947: 839. Schenkling and Marshall 1934: 59. Wibmer and O'Brien 1986: 204.

Recognition (Figs. 1, 2). Adults of *A. signatipennis* are distinguished by the following combination of characters:

Elytra (Figs. 1, 2) without posterolateral maculae; interstria 2 with posteromedian pallid portion bounded anteriorly and posteriorly with short dark portions; interstriae 3, 5, 7 and 9 with long posteromedian dark portion contrasting with short dark portions on interstriae 4, 6 and 8; aedeagus (Figs. 19, 20) with broad, blunt apicomedian prominence.

They are easily distinguished from adults of the other members of the *A. ornatus* group by the distinct elytral pattern. They lack the

large posterolateral elytral maculae characteristic of adults of the other members of the group. Distinctive are the prominent posthumeral patch of pallid scales, the oblique discal fascia of pallid scales extending across interstriae 1-4, and the oblique, alternating dark and pallid elytral fasciae. They are most likely to be confused with adult *A. ornatus* but, in addition to the different elytral pattern (cf. Figs. 1-4), the female sternum 5 lacks posteromarginal emarginations and the male aedeagus lacks acute subapicolateral prominences (cf. Figs. 19, 21, 23).

Adult male. *Length:* 3.28-3.64 mm (\bar{x} = 3.40, n = 10). *Width:* 1.46-1.60 mm (\bar{x} = 1.53, n = 10). *Rostrum:* length 1.30-1.51 × (\bar{x} = 1.40, n = 10) pronotal length; distal portion finely punctate, length 18-30% (\bar{x} = 23, n = 10) of total rostral length. *Prothorax:* pronotum with pallid scales in broad subapical fascia and in posterolateral vittae. *Elytra:* interstriae 3 and 5 slightly elevated at base and on disc; integument and scales dark on humeri, on basal, elevated portions of interstriae 3 and 5, on discal portions of interstriae 1-3, in oblique, irregular, anteromedian and posteromedian fasciae, and on apices of interstriae 4-6; pallid integument and scales predominant in small oblique patches extending across interstriae 1-3, in large, rectangular patch behind humeri, in narrow, oblique, anteromedian fascia that extends posteriorly from interstria 5 to suture, in broader, oblique posteromedian fascia, and on declivity. *Abdomen:* posteromedian portion of sternum 5 slightly depressed behind transverse impression. *Legs:* protibia with slight ventral marginal prominence at proximal 1/3; metatibia narrow, ventral margin slightly, broadly convex in middle 2/3; metatibial mucro short, straight, acute, not excavated.

Adult female. *Length:* 3.40-3.72 mm (\bar{x} = 3.52, n = 10). *Width:* 1.56-1.66 mm (\bar{x} = 1.61, n = 10). *Rostrum:* length 1.25-1.47 × (\bar{x} = 1.36, n = 10) pronotal length; distal portion subcylindrical, shallowly punctate,

glabrous, length 22–29% (\bar{x} = 25, n = 10) of total rostral length. *Pygidium* (Fig. 13): apical margin rounded, without subapical ridge. *Abdomen*: sternum 5 without median emargination. *Legs*: metatibial mucro minute.

Distribution (Fig. 42). The 336 adult specimens of *A. signatipennis* examined are from the following localities. ARGENTINA. *Neuquén*: San Martín de los Andes. *Río Negro*: Ñorquincó. *Santa Cruz*: Cañadón León; Lago Argentina. CHILE. *Aisén*: Chile Chico; Coyhaique; 10 km. N Puerto Ibáñez. *Bío-Bío*: Los Barros, Laguna Laja; Volcán Copahue. *Cautín*: Cherquenco. *Chiloé*: Castro; Chepu; Dalcahue. *Concepción*: Salto de Laja. *Llanquihue*: Lepihue, W of Puerto Montt; Puerto Varas; Los Muermos; Maullín; Puerto Montt. *Magallanes*: Estancia Camerón; Estancia Fenton; Laguna Amarga; Puerto Williams; Punta Arenas; Quinta Pittet; Río Santa María. *Malleco*: Lonquimay; Licura; Laguna Malleco; 19 km. E Manzanar; 20 km. E Manzanar; Pichinahuel, Cordillera Nahuelbuta; 38 km. SE Victoria. *Ñuble*: Las Cabras, Cordillera Chillán; Shangrila, 75 km. E Chillán. *Osorno*: Laguna la Copa, Parque Nacional de Puyehue. *Santiago*: Melocotón; 4 km. W Portillo; Quinta San Ramón. *Talca*: 5 km. W Molino. *Valparaíso*: Algarrobo. The specimens examined were collected during the months of October through February and in April.

Plant associations. Adults of *A. signatipennis* were collected on *Berberis buxifolia* at Chepu, Chiloé, Quinta Pittet and Puerto Williams, Magallanes; on *B. chilensis* at Salto de Laja, Concepción and Algarrobo, Valparaíso; on *B. darwinii* at Laguna la Copa, Osorno, and on *B. ilicifolia* at Chile Chico, Aisén, Chile.

Anthonomus ornatus Blanchard

Figs. 3, 4, 14, 17, 21–24, 38–41, 43

Anthonomus ornatus Blanchard 1851: 387.

Holotype. Chile, female, "provincia de Coquimbo," labelled with green disc and

[15/ 43] [illegible handwritten label] [*Anthonomus/ ornatus*.] [TYPE] [MUSEUM PARIS/ CHILE/ Gay 1843] (MNHN). Kuschel 1950: 17 (= *biplagiatus* Fairmaire, not Redtenbacher [*redtenbacheri* Blackwelder]). Ashworth and Hoganson 1987. Schenkling and Marshall 1934: 58. Wibmer and O'Brien 1986: 204 (= *biplagiatus* Fairmaire, not Redtenbacher [*redtenbacheri* Blackwelder]).

Anthonomus biplagiatus Fairmaire 1884: 503–504. **Holotype.** Chile: "Punta-Arena," female [223] [TYPE] [MUSEUM PARIS/ SANTA-CRUZ/ LEBRUN 1883] [*anthonomus/ biplagiatus/ Fairm*] (MNHN). Kuschel 1950: 17. Wibmer and O'Brien 1986: 204.

Anthonomus redtenbacheri Blackwelder 1947: 839. Replacement name for *A. biplagiatus* Fairmaire (1884) not Redtenbacher (1867).

Recognition (Figs. 3, 4). Adults of *A. ornatus* are distinguished by the following combination of characters:

Elytra (Figs. 3, 4) with large posterolateral maculae; pallid dorsal annuli around maculae broken dorsomedially by dark posteromedian portion on interstria 2; sutural elytral interstriae without apical extensions; sternum 5 of female (Fig. 17) with deep apicomedian emarginations on each side of slender median projection; aedeagus (Figs. 21–24) symmetrical, with rounded apex and acute lateral prominences; pygidium of female (Fig. 14) with weakly developed subapical prominences.

They are distinguished from adults of *A. signatipennis* by the characters discussed under the latter. The elytral patterns are distinct in all specimens of *A. ornatus* examined but there is considerable variation in the ratio of dark and pallid portions. In some, the pallid portions are extensive and clothed with predominantly white scales, with dark fuscous portions correspondingly

limited primarily to the elevated basal and discal portions of interstria 3 and to the edges of the posterolateral maculae. In others, the pallid portions are more extensive, the pallid scales are mostly ferruginous, and dark integument and fuscous scales are extensive on the basal portions of interstriae 2–5, on the median portion of the disc, on the posterolateral maculae and on the declivity. The specimen illustrated (Figs. 3, 4) is somewhat intermediate between the extremes. There is also variation in the shape of the aedeagus. At one extreme the sides, seen in dorsal view (Fig. 21), are subparallel behind the apicolateral projections and the lateral plates are only slightly distended dorsally, as seen in lateral view (Fig. 22). At the other extreme, the sides are broadly constricted in the distal $\frac{2}{3}$ in dorsal view (Fig. 23) and the lateral plates are correspondingly distended dorsally in lateral view (Fig. 24). This variation is not geographical; both extremes are exhibited in specimens from Trapatrapa, Concepción, which do not differ otherwise.

Adult male. *Length*: 2.56–3.32 mm (\bar{x} = 2.90, n = 10). *Width*: 1.16–1.60 mm (\bar{x} = 1.39, n = 10). *Rostrum*: length 1.40–1.70 \times (\bar{x} = 1.60, n = 10) pronotal length; distal portion finely punctate, length 23–32% (\bar{x} = 28, n = 10) of total rostral length. *Prothorax*: pronotum without distinct subapical fascia and dorsolateral vittae of pallid scales. *Elytra*: interstria 3 with slightly elevated basal and discal portions; dark integument and scales predominant on humeri, on basal elevated portions of interstriae 3 and 5 and on discal portions of interstriae 1–3, forming irregular edges of posterolateral maculae, and on apices of interstriae 4–6; pallid integument and scales predominant on posthumeral portions, in broad annuli around edges of posterolateral maculae, in median portion of that macula, and on declivity. *Abdomen*: posteromedian portion of sternum 5 slightly depressed behind transverse impression. *Legs*: protibia with slight midventral marginal prominence; metatib-

ia narrow, straight, with slight ventral marginal prominence; metatibial mucro large, curved, excavated.

Adult female. *Length*: 2.48–3.32 mm (\bar{x} = 2.98, n = 10). *Width*: 1.12–1.58 mm (\bar{x} = 1.41, n = 10). *Rostrum*: length 1.59–1.76 \times (\bar{x} = 1.68, n = 10) pronotal length; distal portion slender, shining, glabrous, length 29–37% (\bar{x} = 35, n = 10) of total rostral length. *Legs*: metatibial mucro minute.

Larva (2 specimens from Frutillar, Llanquihue, Chile, collected November 2, 1983, by G. Kuschel, *ex* flower buds *Berberis buxifolia*). The third instar larva of *A. ornatus* resembles that of *A. kuscheli* in size and other characters except as follows: it is more strongly curved; the ninth abdominal segment is not as long; and there are four epipharyngeal sensory pores instead of three as in *A. kuscheli*. The significance of these apparent differences will have to await the availability of additional specimens.

Pupa (5 specimens from Frutillar, Llanquihue, Chile, collected November 2, 1983, by G. Kuschel *ex* flower buds of *Berberis buxifolia*). *Body*: length 3.8–4.2 mm (n = 5). *Head* (Fig. 38): frontal setae straight to slightly curved; each borne on summit of small, rounded tubercle; pair separated by distance greater than length of a seta. Supraorbital setae absent. One pair of fine basirostral (interocular) setae; each about $\frac{1}{2}$ length of frontal seta. One pair of minute sessile distirostral setae. *Pronotum* (Fig. 39): pronotal setae straight to feebly curved; setae on anterior margin slightly longer and stouter than posterior setae. Anteromedian setae each borne subapically on anterior face of conical, sharply pointed tubercle; tubercles separated by distance equal to ca. width of tubercle at base. Three pairs of anterolateral setae; each borne on summit of slight to distinct tubercle; tubercle of anterolateral 3 often taller than others; setae on each side of pronotum in straight to feebly curved line. Posteromedian setae each borne at or near apex of subconical to acutely pointed tubercle; tubercles separated by distance

slightly greater than length of a seta. Three pairs of posterolateral setae; arranged in curved line on each side of pronotum; each borne on summit of small, rounded tubercle. *Mesonotum*: three pairs of straight mesonotal setae; each borne on summit of rounded tubercle or seta, innermost occasionally subapical on small, acutely pointed tubercle. *Metanotum*: three pairs of straight to curved metanotal setae; more widely spaced than mesonotals; each borne on summit of rounded tubercle; metanotal 2 usually located closer to 3 than to 1. *Abdomen* (Fig. 40): three pairs of discotergal setae and occasionally with additional setaless tubercles on some terminal segments; setae each borne on summit of low tubercle on first two abdominal terga, remaining terga with seta located at base of sharply pointed tubercles that become progressively larger posteriorly. Laterotergal setae 1 and 2 present on each of first 8 terga; seta 1 minute, borne at base of small, sharply pointed tubercle on all terga; seta 2 borne subapically on sharply pointed tubercle, slightly curved, longer than discotergal setae. Anteronotal setae absent. Spiracles well developed on first 5 abdominal segments, feebly developed on segment 6, absent on others. Laterosternal and sub-laterosternal setae absent. Segment 9 bearing a single sharply pointed process which in side view (Fig. 41) is turned slightly upward apically; minute seta borne on each side of segment ca. midway between apex and base of segment.

Distribution (Fig. 43). The 235 adult specimens of *A. ornatus* examined are from the following localities: ARGENTINA. *Neuquén*: San Martín de los Andes. *Río Negro*: Colonia Catedral; Ñorquincó; Río Foyel. *Santa Cruz*: Cañadón León. *Tierra del Fuego*: Bahía San Sebastián, Punta de Arenas. CHILE. *Aisén*: Chile Chico; Coyhaique; Lago Escondido; Lago Frío; 10 km. N Puerto Ibáñez; Quellón. *Bío-Bío*: Los Barros, Laguna Laja. *Chiloé*: Chepu. *Concepción*: Trapatrapa. *Linares*: Parral. *Llan-*

quihue: Frutillar; Río Peñón, Maullín. *Magallanes*: Cerro Castillo; Dos Lagunas; Estancia Camerón; Estancia Canelo; Estancia Fenton; Isla Navarino; Laguna Azul and Ultima Esperanza, Parque Nacional Torres del Paine; Laguna Los Robles; Quinta Pittet; Puerto Williams; Punta Arenas; Rusfin; Río Tres Pasos; Río el Ganso, Seno de Otway. *Malleco*: Icalma; La Fusta; 20 km. E Manzanar; Marimenuco; Cordillera Nahuelbuta; Villa Portales. *Ñuble*: Cordillera Chillán, Las Cabras, Las Trancas, 70 km. E Chillán; El Marchant; Recinto; 4.5 km. SE Recinto. *Osorno*: Antillanca; 2 km. SW Vn. Casablanca, Parque Nacional de Puyehue. The specimens examined were collected during the months of October through February and in April and August. Only one of the specimens on which the reference to *A. ornatus* by Ashworth and Hoganson (1987: 887) is based is that species. The others are *A. signatipennis*, *A. berberidis* and *A. kuscheli*.

Plant associations. Specimens of *A. ornatus* were collected on *Berberis buxifolia* at Chepu, Chiloé, Frutillar, Llanquihue, and Quinta Pittet and Puerto Williams, Magallanes; on *Berberis ilicifolia* at Chile Chico, Aisén, and Puerto Williams, Magallanes; and on *Berberis* sp. at Trapatrapa, Concepción, and Laguna Azul and Ultima Esperanza, Magallanes, Chile.

Anthonomus blanchardi Clark,

NEW SPECIES

Figs. 18, 25, 26, 45

Type specimens. *Holotype*: Chile, male [CHILE/ El Coigo/ Cord. Curico/ Oct–Nov 1959] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand] (NZAC). *Paratypes*: Chile, 1 male, 2 females [CHILE/ El Coigo/ Cord. Curico/ Nov–Dec 1959] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 female [Santiago/ Farellones/ 2200 m/ 10 Dec 1950] [G. Kuschel/ Berberis/ buxifolia] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 female [Chile:

8600'/ Farellones/ P. Santiago/ XII-25-1968] [under dung L &/ C. W. O'Brien]; 1 female [Chile Santiago/ Peñalolén/ 25-I-1975/ Coll: M. Beeche]; 1 female [Altos de Vilches/ Talca A280 mts./ 25-26-XI-1970/ J. Solvericens]. Total paratypes, 7 (CWOB, MNNC, NZAC).

Recognition. Adults of *A. blanchardi* are distinguished by the following combination of characters:

Elytra (cf. Figs. 3, 4) with large posterolateral maculae; pallid dorsal annuli around macula broken medially by dark posteromedian portion on interstria 2; sutural elytral interstriae without apical extensions; sternum 5 of female (Fig. 18) with shallow apicomedian emarginations on each side of short median prominence; aedeagus (Fig. 25, 26) symmetrical, narrowed in distal 1/2, with rounded apex and short, acute apicolateral prominences; pygidium of female (cf. Fig. 14) with weakly developed subapical prominences.

They are distinguished from adults of the closely allied *A. ornatus* by characters of the male genitalia and of sternum 5 of the female. The aedeagus of *A. blanchardi* (Figs. 25, 26) is constricted and narrowed in the distal 2/3 to the apex. The apex itself is slightly distended, rather than being rounded as in *A. ornatus* (cf. Figs. 21, 23, 25). It is also narrower than the apex in that species and has less well-developed apicolateral prominences. The median posteromarginal prominence on sternum 5 of the female is bounded on each side by shallow emarginations rather than being deeply incised as in *A. ornatus* (cf. Figs. 17, 18).

Adult male. *Length*: 2.48–2.68 mm (\bar{x} = 2.58, n = 2). *Width*: 1.30–1.34 mm (\bar{x} = 1.32, n = 2). *Rostrum*: length 1.43–1.55 × (\bar{x} = 1.49, n = 2) pronotal length; distal portion finely punctate, length 32–35% (\bar{x} = 34, n = 2) of total rostral length. *Prothorax*: pronotum without distinct subapical fascia and dorsolateral vittae of pallid scales. *Ely-*

tra: interstria 3 with slightly elevated basal and discal portions; dark integument and scales predominant on humeri, on basal elevated portions of interstriae 3 and 5 and on discal portions of interstriae 1–3, forming irregular edges of posterolateral maculae, and on apices of interstriae 4–6; pallid integument and scales predominant on posthumeral portions, in broad annuli around edges of posterolateral maculae, in median portion of macula, and on declivity. *Abdomen*: posteromedian portion of sternum 5 slightly depressed behind transverse impression. *Legs*: protibia with slight midventral marginal prominence; metatibia narrow, straight, with slight ventral marginal prominence; metatibial mucro large, curved, excavated.

Adult female. *Length*: 2.48–3.16 mm (\bar{x} = 2.81, n = 6). *Width*: 1.10–1.50 mm (\bar{x} = 1.34, n = 6). *Rostrum*: length 1.54–1.69 × (\bar{x} = 1.62, n = 6) pronotal length; distal portion slender, shining, glabrous, length 30–40% (\bar{x} = 35, n = 6) of total rostral length. *Legs*: metatibial mucro minute.

Distribution (Fig. 45). *Anthonomus blanchardi* is known from the type series from the following localities. CHILE. *Curicó*: El Coigo, Cordillera Curicó. *Santiago*: Farellones; Peñalolén. *Talca*: Altos de Vilches.

Plant associations. The paratype of *A. blanchardi* from Farellones, Santiago, Chile, was collected on *Berberis buxifolia*.

Etymology. This species is named for Charles Emile Blanchard (1819–1900) in honor of his contribution to the study of the *A. ornatus* group.

Anthonomus kuscheli Clark,
NEW SPECIES

Figs. 5, 6, 15, 27, 31–37, 44

Type specimens. *Holotype*: Chile, male [CHILE/ Pichinahuél/ Cord. Nahuelbuta/ 1–31 Jan 1959] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand] (NZAC). *Paratypes*: Argentina, 1 female [Argentina/ Río Negro/ L. Nahuelhuapi/ Llao Llao] [24 Nov 1950/ W. Witt-

mer] [Coll. Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male [Argentina/ R. Negro/ L. Nahuelhuapi] [1 Mar 1949/ W. Wittmer] [Coll. Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]. Chile, 1 male [CHILE] [Entomology/ Division/ D.S.I.R./ New Zealand]; 3 males [Aysen/ Río Correntoso/ 22-1-1971/ F. Silva G.] [Ex. Berberis/ buxifolia]; 1 male, 2 females [CHILE: P./ Aisen, 7 km./ W. Coyhaique/ 1-21-1968] [at night L. &/ C. W. O'Brien]; 1 female [CHILE: P./ Aisen, 15 km./ W. Coyhaique/ 1-21-1968] [Collectors: L. &/ C. W. O'Brien]; 1 male [Bio-Bio/ Pemehuc/ R. Renaico] [12 Jan 1946/ G. Kuschel] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male [male symbol] [Cautín/ Vn. Llaima/ 17 Sep 1951/ M. Codoceo] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 1 female [CHILE/ Chiloé/ Chepu/ 22.10.58] [s/ Berberis/ darwini] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 1 female [CHILE/ Chiloé/ Chepu/ 23.9.54] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 6 males, 7 females [CHILE, Llanquihue/ Frutillar/ 31 October 1983/ G. Kuschel] [Berberis/ darwini/ em. 9 Nov 1983]; 1 female [CHILE/ Frutillar/ 27 Feb 1950/ G. Kuschel] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male [CHILE/ Pichinahuel/ Cord. Nahuelbuta/ 1-31 Jan 1959] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 2 males [CHILE/ Pichinahuel 1200 m/ 14-18 Feb 1956] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 12 males, 17 females [CHILE: 19 km./ E. Manzanar/ P. Malleco/ XI-3-1967] [Collectors: L. &/ C. W. O'Brien]; 1 female [Chile: 20 km./ SE Victoria/ P. Malleco/ XI-3-1967] [Collectors: L. &/ C. W. O'Brien] [compared/ with type] [Anthonomus/ ornatus/ Blanch/ det COB 1971]; 2 males, 2 females [Chile: 20 km./ SE. Victoria/ P. Malleco/ XI-3-1967] [Collectors: L. &/ C. W. O'Brien]; 1 male, 1 female [Chile:

38 km./ SE. Victoria/ P. Malleco/ XI-3-1967] [Collectors: L. &/ C. W. O'Brien]; 1 female [CHILE: Laguna de Copa/ P. N. de Puyehue, Osorno Pro./ Site 20, El. 520 m. 7-XII-77/ Valdivian Rain Forest/ Ashworth, Hoganson, Mooers] [on Berberis darwini] [Anthonomus/ ornatus/ Blanchard]; 14 males, 8 females [CHILE: Laguna Espejo/ P. N. de Puyehue, Osorno Pro./ Site 17, El. 520 m. 21-XII-77/ Valdivian Rain Forest/ Ashworth, Hoganson, Mooers] [on Berberis darwini] [Anthonomus/ ornatus/ Blanchard]; 1 male, 2 females [CHILE/ Panquipulli/ Valdivia/ 12 Jan 1944] [G. Kuschel/ Collection] [Entomology/ Division / D.S.I.R./ New Zealand]. Total paratypes, 95; (CACA, CWOB, MNNC, NZAC, TAMU).

Recognition (Figs. 5, 6). Adults of *A. kuscheli* are distinguished by the following combination of characters:

Elytra (Figs. 5, 6) with posterolateral maculae; pallid dorsal annuli around maculae uninterrupted by dark portion on interstria 2; sutural clytral interstriae without apical extensions; aedeagus (Fig. 27) symmetrical, narrowed apically, with slight subapicolateral prominences; pygidium of female (Fig. 15) with subapical prominences; sternum 5 of female with small apicomedian prominence; endophallus (Fig. 27) with two dentate median sclerites in addition to distal sclerite.

They resemble *A. ornatus* but are more elongate in body form and have the discal area of the elytra more flattened so that the basal and discal elevations of interstria 3 are not so distinct. In addition, the pallid annuli around the dorsal portions of the posterolateral elytral maculae are complete in *A. kuscheli* (Figs. 5, 6), not interrupted by a dark portion of interstria 2 as in *A. ornatus* (Figs. 3, 4). The anterior margin of the macula is also less irregular in *A. kuscheli*. Additional differences are found in the male genitalia and in the female abdomen and pygidium. The aedeagus of *A. kuscheli*

is strongly narrowed toward the apex and the apicolateral prominences are weakly developed (Fig. 27). The deep posteromedian incisions of sternum 5 of the female *A. ornatus* are replaced in *A. kuscheli* by a small apicomedian prominence. The female pygidium has large subapical prominences in *A. kuscheli* (Fig. 15), whereas the prominences are weakly developed in *A. ornatus* (Fig. 14).

Adult male. *Length:* 2.72–3.00 mm (\bar{x} = 2.86, n = 10). *Width:* 1.22–1.32 mm (\bar{x} = 1.26, n = 10). *Rostrum:* length 1.31–1.59 \times (\bar{x} = 1.46, n = 10) pronotal length; length of distal portion 24–33% (\bar{x} = 28, n = 10) of total rostral length. *Prothorax:* pronotum without distinct subapical fascia and dorsolateral vittae of pallid scales. *Elytra:* interstria 3 with slightly elevated basal portion, discal elevation feebly developed; dark integument and scales predominant on basal and discal elevations of interstria 3 and around edges of large, posteromedian maculae; pallid integument and scales predominant on sides behind humeri and in complete annuli around dorsal portions of posterolateral maculae. *Abdomen:* posteromedian portion of sternum 5 slightly depressed behind transverse impression. *Legs:* protibia with slight ventral marginal prominence at proximal $\frac{1}{3}$; metatibia narrow, straight, with slight ventral marginal prominence at proximal $\frac{1}{4}$; metatibial mucro large, curved, excavated.

Adult female. *Length:* 2.60–3.12 mm (\bar{x} = 2.88, n = 10). *Width:* 1.12–1.40 mm (\bar{x} = 1.26, n = 10). *Rostrum:* length 1.38–1.61 \times (\bar{x} = 1.49, n = 10) pronotal length; distal portion subcylindrical, shallowly punctate, glabrous, length 29–38% (\bar{x} = 33, n = 10) total rostral length. *Abdomen:* sternum 5 with small apicomedian prominence. *Legs:* metatibial mucro short, curved.

Larva (8 specimens from Frutillar, Llanquihue, Chile, collected October 31, 1983, by G. Kuschel, *ex* flower buds of *Berberis darwini*). *Body* (Fig. 31): curved; length 3.1–5.4 mm (n = 8). Asperities rounded to sub-

conical, fairly evenly distributed over body. Color dingy white, except for brownish pigmented pronotal area. *Head* (Fig. 32): dark brown; width of head capsule 0.51–0.54 mm (n = 8). Basal article of antenna bearing elongate-oval accessory appendage and three short, stout setae, one of which is longer than others. Endocarina (endocarinal line) distinct, slightly longer than $\frac{1}{2}$ length of frons. Epicranial suture (coronal suture) less than $\frac{1}{2}$ length of head capsule. Four pairs of frontal setae; setae 1 and 3 short, seta 4 ca. $2 \times$ length of 3, seta 5 distinctly longer than 4; seta 3 located dorsolaterad of 4. Two pairs of frontal sensilla, one pair in front of frontal setae 1 and other pair located dorsolaterad of setae 3. Five pairs of dorsal epicranial setae; setae 1, 4 and 5 slender, long, ca. equal in length; setae 2 and 3 nearly equal in length, distinctly shorter than other dorsal epicranial setae; seta 3 remote from frontal suture; seta 4 closer to frontal suture than seta 1. Four pairs of minute, peglike posterior epicranial setae that tend to be arranged in a slightly curved line; the lower seta of series located directly above or slightly mesad of dorsal epicranial seta 2. Three pairs of posterior epicranial sensilla; one pair near vertex; one pair dorsad and mesad of dorsal epicranial seta 1; one pair about halfway between dorsal epicranial setae 4 and 5. Lateral epicranial seta 1 short, about $\frac{1}{3}$ length of seta 2. Ventral epicranial setae 1 and 2 ca. equal in length. Clypeus (Fig. 35) with an oblique narrow, nonpigmented area on each side. Clypeal setae slender; seta 1 slightly longer and sometimes located closer to anterior margin of frons than 2. One pair of clypeal sensilla that are located closer to seta 1 than to 2. Three pairs of labral setae; setae 1 and 2 ca. same length; seta 3 shorter. Epipharynx (Fig. 34) (epipharyngeal lining) bearing two pairs of anteromedian setae of ca. same length. Three pairs of stout anterolateral setae present. Labral rods (tormae) stout, converging posteriorly. Three epipharyngeal sensory pores arranged in single cluster. Two pairs

of stout median epipharyngeal spines present between labral rods (tormae). Mandible (Fig. 37) with two well-defined teeth; occasionally outermost tooth considerably reduced; two slender setae ca. same length; one sensillum. Maxillary palps (Fig. 33) with apical article slightly longer than basal article, bearing several minute papillae at apex and sensillum; basal article with short seta and two sensilla. Stipital setae 1, 3 and 4 long, seta 1 slightly longer than other two; seta 2 much shorter than others. Mala (lacinial lobe) bearing 11 stout setae, 6 ventral (ventral lacinial) and 5 dorsal (dorsal lacinial). Labial palpus consists of one segment that bears several small papillae at apex and sensillum. Premental sclerite with long posterior process. One pair of long premental (prelabial) setae present. Three pairs of glossal setae of ca. equal size. Postmental setae (postlabial) 1 and 3 each shorter than 2. *Thorax* (Fig. 31) (setae described on one side of body only): pronotum bearing 8 long setae and two short ones. Five postdorsal setae present; setae 2 and 5 shorter than others. Two spiracular (alar) setae present; one several times longer than other. Epipleural (dorsopleural) lobe bearing one long seta. Two long pleural (ventropleural) setae on prothorax; one seta on each of meso- and metathorax. Three long pedal (laterosternal) setae. Sternal (mediosternal) seta minute. *Abdomen* (Fig. 31): posterior margins of most or all of first seven abdominal segments emarginate dorsally (Fig. 36). Abdominal segments 1-7 bearing three distinct dorsal folds. Prodorsum (fold I) of segments 1-8 with short setae. Five postdorsal (setae of abdominal segment, fold III) setae present; setae 1, 3 and 5 longer than 2 and 4. Two spiracular (alar) setae; seta 2 ca. 3× longer than 1. Epipleurum (dorsopleurum) bearing one long and one short seta. One short pleural (ventropleural) seta and pedal setae ca. same length. Two minute pedal setae present. Anus subterminal; surrounded by four lobes, each bearing minute seta. Seven pairs of minute setae borne on seg-

ment 9. Spiracles bicameral; air tubes with 6 annuli.

Pupa (5 specimens from Frutillar, Llanquihue, collected October 31, 1983, by G. Kuschel, *ex* flower buds of *Berberis darwini*). The pupa of *A. kuscheli* is similar in form and size to *A. ornatus* except the posteromedian pronotal tubercles tend to be larger and the setae are borne apically rather than subapically as usual with the latter species. The best distinguishing character appears to be the discotergal setae on terga 6, 7 and 8 that are borne on the summits of rounded tubercles rather than subapically on acutely pointed tubercles as in *A. ornatus*.

Distribution (Fig. 44). The type series of *A. kuscheli* consists of adult specimens from the following localities. ARGENTINA. *Río Negro*: Lao Liao, Lago Nahuel Huapí. CHILE. *Aisén*: 7 km. W Coyhaique, *Río Correntoso*. *Bío-Bío*: Pemehue. *Cautín*: Volcán Llaima. *Chiloé*: Chepu. *Llanquihue*: Frutillar. *Malleco*: 19 km. E Manzanar, Cordillera Nahuelbuta, Pichinahuel, 20 and 38 km. SE Victoria. *Valdivia*: Panquipulli.

Plant associations. Specimens of *A. kuscheli* were collected on *Berberis darwini* at Chepu, Chiloé, and Frutillar, Llanquihue; and on *B. buxifolia* at *Río Correntoso*, Aisén, Chile. Larvae and pupae were taken from flower buds of *B. darwini*.

Etymology. This species is named in honor of Guillermo Kuschel to commemorate his contributions to the understanding of the weevil fauna of Chile and as a token of appreciation for help extended in the preparation of this paper.

Anthonomus araucanus Clark,

NEW SPECIES

Figs. 7, 8, 16, 28, 45

Type specimens. *Holotype*: Chile, male [CHILE/ Laguna Laja/ Los Barros 1500 m/ 14 Jan 1948] [on/ *Berberis*] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand] (NZAC). *Paratypes*: Chile, 2 females [CHILE/ Laguna Laja/ Los Barros

1500 m/ 14 Jan 1948] [on/ *Berberis*] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 2 males [Bío-Bío/ Cord. Pemehue/ 1500 m] [16 Jan 1944/ G. Kuschel] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 female [Bío-Bío/ La. Laja/ Los Barros/ 1500 m] [13 Jan 1945/ G. Kuschel] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 4 females [Chile: 19 km/ E. Manzanar/ P. Malleco/ XI-3-1967] [Collectors L & C. W. O'Brien]; 2 males [CHILE, Malleco Prov./ 20 km E Manzanar/ 1100 m 19-21.xii./ 1976 H. F. Howden] [beating]; 4 males [Malleco/ L. Malleco/ 1100 m] [22 Jan 1946/ G. Kuschel] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 female [Chile. 12 km./ W. Curicautin (sic)/ P. Malleco/ XI-3-1967] [Collectors L & C. W. O'Brien]; 3 males, 3 females [Chile: 20 km./ SE. Victoria/ P. Malleco/ XI-3-1967]. Total paratypes, 23; (CWOB, HAHC, NZAC, TAMU).

Recognition. Adults of *A. araucanus* are distinguished by the following combination of characters:

Elytra (Figs. 7, 8) with prominent midbasal macula; sutural elytral interstriae without apical extensions; posterolateral elytral maculae weakly developed (Figs. 7, 8), pallid annuli around maculae broken by dark portion on posteromedian portion of interstria 2; rostrum of female short, relatively stout; pygidium of female (Fig. 16) with small apicomedian prominence; aedeagus (Fig. 28) symmetrical, narrowed to bluntly rounded apex; endophallus (Fig. 28) with two dentate median sclerites in addition to distal sclerite.

They are similar in appearance to adults of *A. berberidis*. They are relatively small. In addition, the elytral patterns, with the exception of the prominent, dark midbasal macula, are feebly developed in both species (cf. Figs. 7, 8, 11, 12). The two are easily distinguished; *A. araucanus* lacks the apical extensions of the sutural elytral interstriae

and the large prominence on sternum 5 of the male. In addition, adults of *A. araucanus* have the aedeagus symmetrical rather than asymmetrical as in adult *A. berberidis* (cf. Figs. 28, 30).

Adult male. *Length*: 1.88–2.52 mm (\bar{x} = 2.36, n = 10). *Width*: 0.84–1.22 mm (\bar{x} = 1.12, n = 10). *Rostrum*: length 1.33–1.64 × (\bar{x} = 1.44, n = 10) pronotal length; length of distal portion 23–32% (\bar{x} = 27, n = 10) of total rostral length. *Prothorax*: pronotum without subapical fascia and dorsolateral vittae of pallid scales, middorsal vitta indistinct. *Elytra*: interstria 3 with slight basal and discal elevations; dark integument and scales predominant in large, midbasal macula and forming edges of weakly developed posterolateral maculae. *Abdomen*: sternum 5 with slight apicomedian prominence. *Legs*: protibia with slight ventral marginal prominence at proximal 1/3; metatibia narrow, ventral margin slightly curved in distal 2/3, with slight prominence at proximal 1/4; metatibial mucro large, curved, excavated.

Adult female. *Length*: 2.00–2.44 mm (\bar{x} = 2.30, n = 10). *Width*: 1.02–1.22 mm (\bar{x} = 1.08, n = 10). *Rostrum*: length 1.00–1.52 × (\bar{x} = 1.37, n = 10) pronotal length; distal portion subcylindrical, shallowly punctate, glabrous, length 25–34% (\bar{x} = 30, n = 10) total rostral length. *Abdomen*: sternum 5 with posterior margin straight. *Legs*: metatibia straight, narrow at apex; metatibial mucro short, straight.

Distribution (Fig. 45). The type series of *A. araucanus* consists of adult specimens from the following localities. CHILE. *Bío-Bío*: Laguna Laja, Cordillera Pemehue. *Malleco*: 12 km. W Curacautín; 20 km. E Manzanar; Laguna Malleco; 20 km. SE Victoria.

Plant associations. The holotype and two paratypes were collected on *Berberis* sp. at Los Barros and Laguna Laja, Bío-Bío, Chile.

Etymology. The name of this weevil is derived from that of the Araucanians and emphasizes the fact that it occurs in the heart of their country and that of the *Araucaria*.

Anthonomus chilicola Clark,

NEW SPECIES

Figs. 9, 10, 29, 44

Type specimens. **Holotype:** Chile, male [CHILE, Malleco Prov./ 20 km E Manzanar/ 1100 m 19–21.xii./ 1976 H. F. Howden] [beating] (HAHC). **Paratypes:** Chile, 3 males [CHILE, Malleco Prov./ 20 km E Manzanar/ 1100 m 19–21.xii./ 1976 H. F. Howden] [beating] (HAHC).

Recognition (Figs. 9, 10). Adults of *A. chilicola* are distinguished by the following combination of characters:

Sutural elytral interstriae with acute, overlapping apical extensions; with posterolateral elytral maculae (Figs. 9, 10); pallid annuli around dorsal portions of maculae extending across part of short posteromedian dark portion on interstria 2; metatibia of male with ventral margin strongly concave in distal $\frac{2}{3}$, apical mucro enlarged, excavated; aedeagus (Fig. 29) asymmetrical, constricted medially, with slight subapicolateral prominences.

Like adults of *A. kuscheli*, adult *A. chilicola* are more slender than those of *A. ornatus* (cf. Figs. 4, 10). The elytral pattern in *A. chilicola* is essentially the same as in *A. ornatus*, but the pallid annuli around the posterolateral maculae are partially interrupted by encroachment of dark integument and scales on interstria 2 (Fig. 10). Adult *A. chilicola* are further distinguished from adults of both of these species, however, by the apical extensions of the sutural elytral interstriae, by the male metatibia which is strongly, broadly concave on the ventral margin and has a much larger, more strongly excavated metatibial mucro, and by the asymmetrical aedeagus. These are all characters adult *A. chilicola* share with adult *A. berberidis*, which are distinguished by the less distinct elytral pattern (cf. Figs. 9–12), the large posterolateral prominence on sternum 5 of the male, and by differences in the aedeagus (cf. Figs. 29, 30).

Adult male. **Length:** 3.40–4.00 mm (\bar{x} = 3.75, n = 4). **Width:** 1.40–1.64 mm (\bar{x} = 1.57, n = 4). **Rostrum:** length 1.47–1.67 \times (\bar{x} = 1.58, n = 4) pronotal length; length of distal portion 21–31% (\bar{x} = 25, n = 4) of total rostral length. **Prothorax:** pronotum without distinct subapical fascia and dorsolateral vittae of pallid scales. **Elytra:** interstria 3 with slightly elevated basal and discal portions; dark integument and scales predominant on humeri and on basal and discal elevations of interstria 3, less dense on basal portions of interstriae 2, 4 and 5 and on discal portion of 2, forming broad, irregular edges of posteromedian maculae; pallid integument and scales predominant behind humeri and in oblique fascia extending posteriorly to posteromedian portion of interstria 2 then curving posteriorly to apices of interstriae 4–6. **Abdomen:** posteromedian portion of sternum 5 slightly depressed. **Legs:** procoxae with dense, broad, pallid scales; protibia with slight ventral marginal prominence at proximal $\frac{1}{3}$; metatibia narrow, slightly curved, with slight ventral marginal prominence at proximal $\frac{1}{4}$; metatibial mucro large, curved, excavated.

Adult female. Unknown.

Distribution (Fig. 44). The type series of *A. chilicola* consists of adult specimens from the following locality. CHILE. **Malleco:** 20 km. E Manzanar.

Plant associations. Unknown.

Etymology. The name of this species is derived from that of its native country, emphasizing the unique austral distribution of the group to which it belongs.

Anthonomus berberidis Clark,

NEW SPECIES

Figs. 11, 12, 30, 45

Type specimens. **Holotype:** Chile, male [CHILE/ Frutillar/ 14 Dec 1943/ G. Kuschel] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand] (NZAC). **Paratypes:** ARGENTINA, 1 male, 1 female [ARGENTINA/ El Bolson, Rio/

- Negro/ IX-20-1963/ A. Kovacs]. Chile, 1 male [Chili] [Deyr.]; 2 males, 4 females [CHILE: 19 km. S. of Ancud./ Is. Chiloe/ Site C2. El. 120 m. 14-II-79/ Valdivian Rain Forest/ Ashworth, Hoganson, Gordon] [on *Berberis darwinii*] [Anthonomus/ ornatus/ Blanchard]; 5 males, 6 females [CHILE/ Chiloé/ Chepu/ 22.10.58] [s/ *Berberis darwinii*] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 3 males, 2 females [Chile: 9 km./ E. Chepu/ Chiloe Is/ II-4-1968] [at night L. & C. W. O'Brien]; 2 females [Chile: 13/ km. S. Castro/ Is Chiloe/ II-5-1968] [Collectors: L & C. W. O'Brien]; 1 female [Dalcahue/ Chiloe, CHILE]; 1 female [CHILE/ Dalcahue/ Chiloe/ 10-20 Nov 1957] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male [Quellón-Chiloe I-1955/ J. S. Vargas]; 1 female [CHILE: Chiloé/ Dalcahue/ 17-31.i.1962/ Luis Peña] [H. & A. Howden/ Collection]; 1 male, 1 female [Pto Montt/ 15.1.71]; 1 female [Chile: 12 km. N./ Puerto Montt/ P. Llanquihue/ II-8-1968] [at night L. & C. W. O'Brien]; 3 males, 5 females [CHILE/ Llanquihue/ Frutillar/ 13.9.54] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 3 females [CHILE, 2 km./ S. Frutillar/ P. Llanquihue/ 280' II-3-1968] [Collectors: L & C. W. O'Brien]; 1 male, 1 female [CHILE/ Llanquihue/ Frutillar/ 23.9.54] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 3 males, 2 females [CHILE/ Llanquihue/ Frutillar/ 24.2.50] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 3 females [CHILE/ Frutillar/ 14 Dec 1943/ G. Kuschel] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male [CHILE/ Frutillar/ 28 Dec 1944/ G. Kuschel] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 1 male, 7 females [CHILE/ Frutillar/ 27 Feb 1950/ G. Kuschel] [G. Kuschel/ Collection] [Entomology/ Division/ D.S.I.R./ New Zealand]; 2 males, 1 female [MAULLIN a/ Las Quemas/ Llanquihue/ 17,-Dic.1972/ Coll: L. E. Pena]; 1 male [CHILE/ Volcán Osorno/ 4.3.50/ Kuschel leg.] [Coll./ Kuschel] [Entomology/ Division/ D.S.I.R./ New Zealand]. 1 male [CHILE: Laguna de Copa/ P. N. de Puyehue, Osorno Pro./ Site 20. El. 520 m. 7-XII-77/ Valdivian Rain Forest/ Ashworth, Hoganson, Mooers] [on *Berberis darwinii*] [Anthonomus/ ornatus/ Blanchard]; 3 males, 2 females [CHILE: Laguna Espejo/ P. N. de Puyehue, Osorno Pro./ Site 17. El. 520 m. 21-XII-77/ Valdivian Rain Forest/ Ashworth, Hoganson, Mooers] [on *Berberis darwinii*] [Anthonomus/ ornatus/ Blanchard]; 3 males, 8 females [CHILE: Laguna Espejo/ P. N. de Puyehue, Osorno Pro./ Site 17A. El. 520 m. 10-1-79/ Valdivian Rain Forest/ A. C. Ashworth, J. W. Hoganson] [on *Berberis* sp.] [Anthonomus/ ornatus/ Blanchard]; Total paratypes, 87; (AMNH, CACA, HAHC, MNHC, MCZC, NZAC, TAMU).
- Recognition (Figs. 11, 12). Adults of *A. berberidis* are distinguished by the following combination of characters:
- Sutural elytral interstriae with acute, overlapping apical extensions; postero-lateral elytral maculae feebly developed (Figs. 11, 12), surrounded dorsally by complete pallid annuli; sternum 5 of male with large posteromedian prominence; metatibia of male with ventral margin strongly concave in distal $\frac{2}{3}$, with enlarged, excavated, apical mucro; pygidium of female with small apicomedian prominence; aedeagus (Fig. 30) asymmetrical, constricted medially, with blunt subapicolateral prominences.
- These, and adults of the closely related *A. chilicola* have the aedeagus similarly asymmetrical (cf. Figs. 29, 30), similarly modified male metatibiae with the ventral marginal concavity, enlarged, strongly excavated apical mucrones, and similar extension of the extreme apices of the sutural elytral interstriae. This latter feature is even more pronounced in adult *A. berberidis* where the

extension of the right elytron overlaps that of the left one. The elytral pattern of light and dark integument and scales is also similar in adult *A. chilicola* and *A. berberidis*, but is weakly developed in adult *A. berberidis*, which have a prominent midbasal macula (cf. Figs. 9, 12). The large apico-medial prominence on sternum 5 of the male is unique to adults of *A. berberidis*.

Adult male. *Length*: 2.52–3.04 mm (\bar{x} = 2.83, n = 10). *Width*: 1.12–1.44 mm (\bar{x} = 1.28, n = 10). *Rostrum*: length 1.02–1.48 × (\bar{x} = 1.32, n = 10) pronotal length; length of distal portion 22–31% (\bar{x} = 25, n = 10) of total rostral length. *Prothorax*: pronotum without subapical fascia and dorsolateral vittae of pallid scales; middorsal vitta indistinct. *Elytra*: interstria 3 without distinct basal and discal elevations; dark integument and scales predominant in large, mid-basal macula and forming edges of weakly developed posterolateral maculae. *Legs*: protibia with distinct ventral marginal prominence at proximal 1/3; metatibia narrow, ventral margin strongly curved in distal 2/3, with distinct prominence at proximal 1/4; metatibial mucro large, curved, excavated.

Adult female. *Length*: 2.16–3.16 mm (\bar{x} = 2.87, n = 10). *Width*: 0.92–1.36 mm (\bar{x} = 1.26, n = 10). *Rostrum*: length 0.87–1.40 × (\bar{x} = 1.28, n = 10) pronotal length; distal portion subcylindrical, shallowly punctate, glabrous, length 26–33% (\bar{x} = 29, n = 10) total rostral length. *Abdomen*: sternum 5 with posterior margin straight. *Legs*: metatibia straight, narrow at apex, apical mucro short, straight.

Distribution (Fig. 45). The type series of *A. berberidis* consists of adult specimens from the following localities. ARGENTINA. *Río Negro*: El Bolsón. CHILE. *Chiloé*: 19 km. S Ancud; 13 km. S Castro; Chepu; Dalcahue; Puerto Montt; 12 km. N Puerto Montt; Quellón. *Llanquihue*: Frutillar; 2 km. S Frutillar; Maullín. *Osorno*: Laguna la Copa and Laguna Espejo, Parque Nacional de Puyehue; Volcán Osorno.

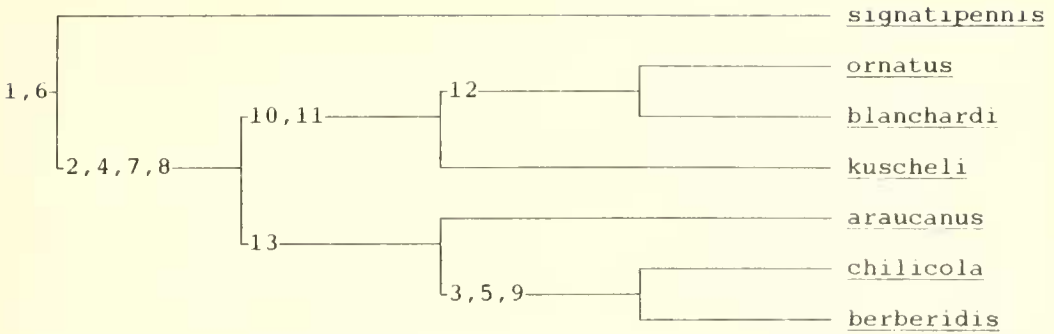
Plant associations. Specimens of *A. berberidis* were collected on *Berberis darwini* 19 km. S Ancud and at Chepu, Chiloé, and at Laguna la Copa and Laguna Espejo, Parque Nacional de Puyehue, Osorno, Chile. Label data indicate that adults have been collected in January, February, March, September, October, November and December.

Etymology. The name of this species is derived from that of the plant genus with which it and several other *A. ornatus* group members are associated.

PHYLOGENY

The classification of the subfamily Anthonominae has been called "chaotic" (Burke 1976). Some 500, mostly New World, named species are assigned to the subfamily, but recent revisionary studies (Clark 1987a, b, c, 1988, Clark and Burke 1985, 1986a, b, c) indicate that the actual number of species may be twice that. Within this unwieldy mass of species, some apparently natural groupings do present themselves, but it is not often possible to identify the sister groups of these. This is the case with the *A. ornatus* group. The group seemed by preliminary inspection to be natural, but identification of the sister group remains for future studies. Thus, in order to apply the outgroup method of comparison to identify apomorphic characters in the *A. ornatus* group, it was necessary to attempt to identify characters unique to the group by examining a broad, though incomplete, array of anthonomine taxa. Further studies may reveal that some of these characters are more widely distributed.

The most detailed comparisons included those of characters of the *A. ornatus* group with those of anthonomines examined in connection with ongoing revisionary studies. These include the species in the *Anthonomus* *albolineatus*, *furcatus*, *grandis*, *gularis*, *unipustulatus*, and *venustus* groups, the species of the *Anthonomus* subgenera *Anthomorpha*, *Anthonomocyllus* and *An-*



46

Fig. 46. Phylogenetic tree depicting hypothesized relationships of the species of the *A. ornatus* group.

thonomorphus, the genera *Atractomerus*, *Loncophorus*, *Omogonus* and *Pseudanthonomus*, and the types of most of the named Neotropical Anthonominae. Numerous Nearctic and Old World species have also been examined, but not in as much detail. There is no indication that any of the species examined should be placed in the *A. ornatus* group, nor are there indications that any of them is the sister group of the *A. ornatus* group.

As a result of the comparisons made, 13 characters (listed below) were determined to be unique to adults of the *A. ornatus* group. The distribution of these characters among the seven species in the group is depicted in Table 1. Presence is indicated by a score of "1," absence by a score of "0," "missing," because the female of *A. chili-*

cola is unknown, by a score of 9. These characters were analyzed using the PAUP computer programs developed by Swofford (1985), on an IBP Personal Computer to determine the most parsimonious branching pattern consistent with this distribution of characters. Analysis of the 13 characters, all given equal weight, with the ALLTREES option which searches all possible trees, produced the phylogenetic tree depicted in Fig. 46. The characters, with comments on their distributions under the constraints of the accepted solution, are listed below.

- 1) Elytral integument with markedly contrasting patterns of pallid and dark portions clothed with correspondingly pallid and dark scales ranging from white through pallid to dark ferruginous to

Table 1. Data matrix for the phylogenetic tree in Fig. 46.

	Characters												
	0	0	0	0	0	0	0	0	0	1	1	1	1
	1	2	3	4	5	6	7	8	9	0	1	2	3
Outgroup	0	0	0	0	0	0	0	0	0	0	0	0	0
<i>signatipennis</i>	1	0	0	0	0	1	0	0	0	0	0	0	0
<i>ornatus</i>	1	1	0	1	0	1	0	1	0	1	1	1	0
<i>blanchardi</i>	1	1	0	1	0	1	0	1	0	1	1	1	0
<i>kuscheli</i>	1	1	0	1	0	1	1	1	0	1	1	0	0
<i>araucanus</i>	1	1	0	0	0	1	1	1	0	0	0	0	1
<i>chilicola</i>	1	1	1	1	1	1	0	1	1	9	9	9	9
<i>berberidis</i>	1	1	1	0	1	1	0	1	1	0	0	0	1

fuscous (Figs. 1–12). Although contrasting patterns of light and dark integument and light and dark scales are not unique to the *A. ornatus* group, the patterns are similar in the species in the group and do not seem to be exactly duplicated in any of the other anthonomines.

- 2) Elytra with large, posterolateral maculae (Figs. 3–12). These are weakly developed in *A. araucanus* and *A. berberidis* (Figs. 7, 8, 11, 12).
- 3) Sutural elytral interstriae with acute, overlapping apical extensions.
- 4) Aedeagus with apicolateral prominences (Figs. 21, 23, 25, 27, 29). These are assumed to have been lost in *A. araucanus* (Fig. 28) and *A. berberidis* (Fig. 30).
- 5) Aedeagus asymmetrical (Figs. 29, 30).
- 6) Endophallus with an elongate, flat, distal sclerite (Figs. 19–30).
- 7) Endophallus with two dentate median sclerites (Figs. 27, 28). These are assumed to have been secondarily lost in the ancestor of *A. ornatus* and *A. blanchardi* and in that of *A. chilicola* and *A. berberidis*.
- 8) Parameres of tegmen of male genitalia close together or fused at base.
- 9) Metatibia of male with ventral margin strongly concave in distal $\frac{2}{3}$, with enlarged, excavated, apical mucro.
- 10) Pygidium of female with subapical prominences (Figs. 14, 15). These are weakly developed and assumed to be obsolescent in *A. ornatus* (Fig. 14) and *A. blanchardi*.
- 11) Sternum 5 of female with apicomedian prominence. This is a simple prominence in *A. kuscheli*, a prominence bounded by shallow emarginations in *A. blanchardi* (Fig. 18), a long prominence bounded on each side by deep incisions in *A. ornatus* (Fig. 17).
- 12) Sternum 5 of female incised or emarginate (Figs. 17, 18).
- 13) Pygidium of female with apicomedian prominence (Fig. 16).

ACKNOWLEDGMENTS

Thanks are extended to the individuals and institutions listed in the Materials and Methods section for arranging loans of the specimens used in this study. Guillermo Kuschel initially suggested the group as suitable for revision, provided information and other valuable assistance, along with a critical review of the manuscript. Charles W. O'Brien and Guillermo Wibmer also reviewed the manuscript. This paper is published as Alabama Agricultural Experiment Station Journal Series No. 17-881496P and Texas Agricultural Experiment Station T.A. 23182.

LITERATURE CITED

- Ahmad, M. and H. R. Burke. 1972. Larvae of the weevil tribe Anthonomini (Coleoptera: Curculionidae). Misc. Publ. Entomol. Soc. Amer. 8: 31–81.
- Anderson, W. H. 1947. A terminology for the anatomical characters useful in the taxonomy of weevil larvae. Proc. Entomol. Soc. Wash. 49: 123–132.
- Ashworth, A. C. and J. W. Hoganson. 1987. Coleoptera bioassociations along an elevational gradient in the Lake Region of southern Chile, and comments on the postglacial development of the fauna. Ann. Entomol. Soc. Amer. 80(6): 865–895.
- Blackwelder, R. E. 1947. Checklist of the coleopterous insects of Mexico, Central America, the West Indies and South America, Part 5. Bull. U.S. Natl. Mus. (185): 1–IV, 765–925.
- Blanchard, C. E. 1851. Fauna chilena. Insectos. Coleópteros, pp. 286–429. In Gay, C., ed., Historia física y política de Chile, vol. 5, Zool., pp. 285–563.
- Burke, H. R. 1968. Pupae of the weevil tribe Anthonomini (Coleoptera: Curculionidae). Tech. Monog. 5, Texas Agric. Exp. Sta., 92 pp.
- . 1976. Bionomics of the anthonomine weevils. Ann. Rev. Entomol. 21: 283–303.
- Cabrera, A. L. and A. Willink. 1973. Biogeografía de América Latina. Organización de los Estados Americanos, Washington, D.C., vi + 120 pp.
- Clark, W. E. 1987a. Revision of the *unipustulatus* group of the weevil genus *Anthonomus* Germar (Coleoptera: Curculionidae). Coleopt. Bull. 41(1): 73–88.
- . 1987b. Revision of the Nearctic species of *Pseudanthonomus* Dietz (Coleoptera: Curculionidae). Coleopt. Bull. 41(3): 263–285.
- . 1987c. Revision of the *Anthonomus* subgenus *Anthomorphus* Weise (Coleoptera: Curculionidae). Quaest. Entomol. 23: 317–364.

- . 1988. The species of *Anthonomus* in the *albolineatus* group (Coleoptera: Curculionidae). *Trans. Amer. Entomol. Soc.* 113: 309–359.
- Clark, W. E. and H. R. Burke. 1985. Revision of the *venustus* species group of the weevil genus *Anthonomus* Germar (Coleoptera: Curculionidae). *Trans. Amer. Entomol. Soc.* 111: 103–170.
- . 1986a. Revision of the *gularis* species group of the genus *Anthonomus* Germar (Coleoptera: Curculionidae). *Coleopt. Bull.* 40(1): 1–26.
- . 1986b. Phylogeny of the species of the *Anthonomus* subgenus *Anthonomorphus* Dietz, with discussion of relationships with *Anthonomus grandis* Boheman (Coleoptera: Curculionidae). *J. Kans. Entomol. Soc.* 59(3): 508–516.
- . 1986c. A new neotropical species of *Anthonomus* Germar (Coleoptera: Curculionidae) associated with *Bombacopsis quinata* (Bombacaceae). *Proc. Entomol. Soc. Wash.* 88(2): 320–327.
- Clark, W. E. and R. P. Martins. 1987. *Anthonomus biplagiatus* Redtenbacher (Coleoptera: Curculionidae), a Brazilian weevil associated with *Kielmeyera* (Guttiferae). *Coleopt. Bull.* 41(2): 157–164.
- Cronquist, A. 1981. *An Integrated System of Classification of Flowering Plants*. Columbia University Press, New York. xviii + 1262 pp.
- Davis, D. R. 1986. A new family of Monotrysiian moths from Austral South America (Lepidoptera: Palaephatidae), with a phylogenetic review of the Monotrysiia. *Smiths. Contr. Zool.*, 434. Smithsonian Institution Press, Washington, D.C., iv + 202 pp.
- Fairmaire, L. 1884. Note sur quelques Coléoptères de Magellan et de Santa-Cruz. *Ann. Soc. Entomol. France*, 1883 (1884), ser. 6, 3: 483–506.
- Good, R. 1964. *The Geography of Flowering Plants*. Longmans, Green and Co., Ltd., London.
- Kuschel, G. 1950. Nuevas sinonimias, revalidaciones y combinaciones (9° aporte a Col. Curculionidae). *Agric. Téc., Chile* 10(1): 10–21.
- . 1960. Terrestrial zoology in southern Chile. *Proc. Royal Soc. London*, series B. 152: 540–550.
- O'Brien, C. W. and G. J. Wibmer. 1982. Annotated checklist of the weevils (Curculionoidea *sensu lato*) of North America, Central America, and the West Indies (Coleoptera: Curculionidae). *Mem. Amer. Entomol. Inst.* (34): i–ix, 1–382.
- Raven, P. H. 1963. Amphitropical relationships in the floras of North and South America. *Quart. Rev. Biol.* 38(2): 151–177.
- Schenkling, S. and G. A. K. Marshall. 1934. *Coleopterorum Catalogus, Pars 139, Curculionidae: Anthonominae*, pp. 3–82; *Laemosaccinae*, pp. 1–8. (vol. 29).
- Swofford, D. L. 1985. *PAUP: Phylogenetic Analysis Using Parsimony. Users Manual*, Illinois Natural History Survey, Champaign, Ill.
- Thomas, J. B. 1957. The use of larval anatomy in the study of bark beetles (Coleoptera: Scolytidae). *Can. Entomol.* 89, Suppl. 5, 45 pp.
- Wibmer, G. J. and C. W. O'Brien. 1986. Annotated checklist of the weevils (Curculionidae *sensu lato*) of South America (Coleoptera: Curculionoidea). *Mem. Amer. Entomol. Inst.* (39): i–xvi, 1–563.