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INTRODUCED AND EXPORTED AMERICAN SCOLYTIDAE (COLEOPTERA)¹

Stephen L. Wood²

ABSTRACT.—Fourteen North, Central, and South American Scolytidae have reached areas outside of America, namely Hawaii (5), Australia (3), Southeast Asia (2), Africa (7), Europe (1), and worldwide (1). The 44 species introduced into North and Central America have originated in South America (10), Southeast Asia (15), Africa (14), or Europe (7). Four North and Central American species have extended their ranges into new territory within this region. Most of the species that breed in the bole or roots of their host were imported more than a half century ago; those imported since 1950 breed mostly in seeds, pods, dry fruits, or small branches. Forty-five of the 62 species apparently can reproduce by means of facultative arrhenotokic parthenogenesis.

A brief report on the extraterritorial distribution of American Scolytidae to the Fourteenth International Congress of Entomology (Wood 1972) aroused interest sufficient to prompt a more comprehensive review. This report omits those species that have moved into or out of North and Central America through natural migration. Those species intercepted in routine border inspection and not actually established in an extraterritorial locality are also omitted. This report includes only those species for which I have examined specimens taken from a breeding population in an extraterritorial locality. In most instances the introductions to new areas have occurred within the past century, and the spread of each species is part of the historical record. In other cases the entry and spread was not recorded, and the importation is based on undocumented circumstantial evidence. An account of the nomenclature, distribution, hosts, classification, etc., will be published in my monograph of North and Central American Scolytidae (currently in preparation). The documentation for the many items cited below will appear in the monograph.

Of the 62 species listed here (Table 1), six are native North or Central American species that were introduced to another extraterritorial part of North or Central America. The 14 species exported from North,

Central, and South America have reached the following areas (some have reached more than one area):

Hawaii 5	Africa 7
Australia 3	Europe 1
S.E. Asia 2	Worldwide 1

Of the 44 species imported into North and Central America, probable areas of origin are (three Asian species also occur in Africa):

South America 10	Africa 14
S.E. Asia 15	Europe 7

The 62 species treated here are sorted on the basis of the host material usually selected for the excavation of breeding tunnels as follows:

Roots	2
Bole or logs	11
Twigs and branches	28
Both seeds and branches	7
Seeds, pods, dry fruits	10
Misc. branches, weeds, herbs, etc.	2
Fruiting stalks of grass	1
Unknown	1

Almost all of the imported species that breed in roots, logs, or boles were established in North and Central America a half century or more ago. Those species imported since about 1940 breed almost exclusively in seeds, pods, or other dry fruit-

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TABLE 1. North and Central American Scolytidae that have been introduced from or exported to foreign lands.

Species	Probable origin	Introduced to	Host material
<i>Araptes politus</i>	Mexico, C. America	Florida, Antilles	Seeds
<i>Coccotrypes aciculatus</i>	New Guinea?	Panama and Brazil	
" <i>advena</i>	S.E. Asia, Indonesia	Cuba to S. America	Seeds or branches
" <i>carpophagus</i>	Africa?	Florida to S. America	Seeds
" <i>dactyliperda</i>	Africa?	USA to S. America	Seeds
" <i>distinctus</i>	Ceylon?	Florida to S. America	Palm fruits
" <i>indicus</i>	S.E. Asia	Florida to S. America	Seeds
" <i>rhizophorae</i>	Indonesia	Florida, Galapagos Islands	Mangrove "seeds"
<i>Corthylus spinifer</i>	C. and S. America	Florida	Branches or seedlings
<i>Cryphalomorpha jalapae</i>	Mexico	Worldwide interceptions	Jalapa root
<i>Cryptocarenum heveae</i>	C. and S. America	Africa, Florida	Branches, etc.
" <i>seriatum</i>	S. America	Florida, Antilles	Branches, etc.
<i>Crypturgus pusillus</i>	Europe, Asia	E. North America	<i>Picea</i> boles
<i>Dendroctonus frontalis</i>	USA	Honduras	<i>Pinus</i> boles
<i>Gnathotrichus materiarius</i>	E. North America	France	<i>Pinus</i> boles
<i>Hylastinus obscurus</i>	Europe	N. America	Clover roots
<i>Hypocryphalus mangiferae</i>	India	Florida to S. America, etc.	<i>Mangifera indica</i>
<i>Hypothenemus aequaliclavatus</i>	Indonesia	Honduras, Jamaica	Unknown
" <i>africanus</i>	S. Africa	USA to S. America	Fruits, branches
" <i>arecae</i>	S.E. Asia	Florida to S. America, etc.	Seeds, branches, etc.
" <i>birmanus</i>	S.E. Asia	Florida, C. America, etc.	Branches
" <i>brunneus</i>	Africa?	USA to Trinidad	Branches
" <i>californicus</i>	Africa?	USA to Mexico	Twigs, etc.
" <i>columbi</i>	Africa?	USA to S. America	Twigs, weeds, etc.
" <i>rudiae</i>	S.E. Asia?	USA to S. America	Twigs, weeds, etc.
" <i>cylindricus</i>	Africa?	Mexico to S. America	Branches
" <i>erectus</i>	Africa?	USA to S. America	Branches
" <i>eruditus</i>	Tropical America?	Almost cosmopolitan	Twigs, seeds, etc.
" <i>hampei</i>	Africa	C. and S. America, etc.	Coffee berries
" <i>javanus</i>	Africa?	Florida to S. America, etc.	Branches, pods
" <i>obscurus</i>	Tropical America	Intercepted worldwide	Brazil nuts, etc.
" <i>parallelus</i>	Mexico	Hawaii	Twigs?
" <i>pubescens</i>	Tropical America?	Florida, Hawaii, etc.	Grass
" <i>seriatum</i>	Tropical America?	USA, Africa, etc.	Twigs, seeds, etc.
" <i>setosus</i>	Africa?	Antilles to S. America	Fruits, pods, etc.
<i>Ips grandicollis</i>	N. America	Australia	<i>Pinus</i> limbs, etc.
<i>Microborus boops</i>	C. America	Africa, Jamaica	Branches, etc.
<i>Pagiocerus frontalis</i>	S. America	USA, etc.	Seeds
<i>Phloeosinus cupressi</i>	N. America	Panama, Australia, etc.	<i>Cupressus</i> branches
<i>Pityophthorus confusus</i>	USA	Honduras	<i>Pinus</i> bole
" <i>juglandis</i>	Arizona	California	<i>Juglans</i> branches
<i>Premnobius cacipennis</i>	Africa	Florida to S. America	Limbs, etc.
" <i>ambitosus</i>	Africa	S. America	Limbs, etc.
<i>Scolytus mali</i>	Europe	N. America	Fruit trees
" <i>multistriatus</i>	Europe	N. America, etc.	<i>Ulmus</i> limbs, etc.
" <i>rugulosus</i>	Europe	N. America, etc.	Fruit trees
<i>Xyleborinus aspericauda</i>	C. and S. America	Florida	Limbs, logs
" <i>saxseni</i>	Europe	N. America, etc.	Limbs, logs, etc.
<i>Xyleborus affinis</i>	Tropical America	Hawaii to Malaya, Africa	Logs, etc.
" <i>dispar</i>	Europe	N. America	Limbs, etc.
" <i>ferrugineus</i>	Tropical America	Hawaii to Australia, Africa	Logs
" <i>obliquus</i>	S. America?	N. America, Africa	Branches
" <i>rubricollis</i>	S.E. Asia	N. America	Branches, boles, etc.
" <i>spinulosus</i>	Tropical America	Hawaii	Limbs
" <i>validus</i>	S.E. Asia	New York	Limbs, etc.
" <i>volulus</i>	Tropical America	Hawaii to Malaya, Africa	Logs
" <i>xylographus</i>	E. North America	California	<i>Quercus</i> logs
<i>Xylosandrus compactus</i>	S.E. Asia?	Florida, Cuba, Africa, etc.	Twigs
" <i>crassiusculus</i>	S.E. Asia	South Carolina, Hawaii	Branches
" <i>germanus</i>	Japan	USA	Limbs, etc.
" <i>morigerus</i>	S.E. Asia	C. and S. America	Branches, etc.
" <i>zimmermanni</i>	Tropical America	Florida	Branches

ing structures or in small branches. It is of interest that 45 of the 62 species can reproduce by means of facultative arrhenotokic parthenogenesis, by which means one female can establish an entire breeding population.

Araptus politus Blandford, 1904, is native to southern Mexico and Central America, where it breeds in *Mucuna* seeds. It has been taken in Haiti (Cola nuts), Jamaica and Cuba (host not recorded), and Miami, Florida (intercepted in "bird seed"; breeding in "seeds") since 1960.

Coccotrypes aciculatus Schedl, 1952, was named from New Guinea. It has been taken in Brazil (Cuma nuts), Costa Rica, and Panama (at light) since 1938. Its hosts and habits are unknown.

Coccotrypes advena Blandford, 1894, is apparently a native of Indonesia. It has been taken in India, Java, Japan, Micronesia, Samoa, Hawaii, Surinam, and Cuba since 1915. It breeds in either bark or large seeds of a variety of tropical hosts.

Coccotrypes carpophagus (Hornung, 1842) was named from betel nuts from India, although it probably originated in Africa. It has spread to virtually all tropical and subtropical areas of the world, where it breeds in a wide variety of nuts and other large seeds. It is commonly intercepted throughout the world, but in North America it breeds permanently only in southern Florida and Mexico.

Coccotrypes dactyliperda (Fabricius, 1801) is probably of African origin. It breeds in virtually all tropical and subtropical areas of the world. It is most common in date pits, but may breed in a wide variety of nuts, seeds, and buttons or other objects made from vegetable ivory. It breeds in Florida and Arizona and probably in other southern states.

Coccotrypes distinctus (Motschulsky, 1866) was named from Ceylon, where it probably originated. It has also been reported from Micronesia, Hawaii, Honduras, Puerto Rico, British Guiana, and southern Florida, where it breeds in a wide variety of palm seeds.

Coccotrypes indicus (Eggers, 1936) was named from India. It is widely distributed in southeastern Asia and Indonesia, and has

been reported from the Fiji Islands, Tahiti, Hawaii, Brazil, Surinam, Trinidad, Puerto Rico, Martinique, Guadeloupe, Costa Rica, Panama, and Coral Gables, Florida. It has been intercepted in various seeds at several American ports. It probably is capable of breeding in large seeds in most southern states of the U.S.A.

Coccotrypes rhizophorae (Hopkins, 1915) is apparently from Indonesia. It also breeds in the Galapagos Islands and southern Florida. It infests the viviparous seeds of mangrove (*Rhizophora mangle*).

Corthylus spinifer Schwarz, 1891, was named from Florida, but it is very doubtful that it is a native species. In addition to Florida, its present distribution extends from Brazil to Veracruz, Mexico. Several related species occur in Central America and northern South America. In all probability, it has spread through commerce to Brazil and Florida in the past century.

Cryphalomorphus jalapae (Letzner, 1848) is native to Mexico, where it breeds in jalapa root (presumably *Exogonium jalapa*). It is not known to be permanently established in any invaded territory.

Cryptocarenum heveae (Hagedorn, 1912) was named from Africa (Congo), where it damaged rubber trees. It is now known to be native to Mexico, Central America, and northern South America. It also breeds in Ghana, Congo, Brazil, Jamaica, Cuba, and southern Florida. It infests the pith of small, broken, or unthrifty stems of a wide variety of trees, shrubs, and woody vines.

Cryptocarenum seriatus Eggers, 1933, is probably native to Bolivia and Peru, but now occurs throughout South America, Central America, Mexico, Jamaica, Haiti, the Virgin Islands, Cuba, Florida, and southern Texas. It appears to have entered the United States since 1930 and to have reached Central America and Mexico after 1915 but prior to 1953. It breeds in the small branches of a wide variety of trees, shrubs, and woody vines.

Crypturgus pusillus (Gyllenhal, 1813) is native to Europe, north Africa, and northern Asia. It was apparently introduced to eastern Canada and/or the northeastern United States in the colonial period. It is a

secondary enemy of spruce (*Picea*), and breeds from Ontario and Newfoundland to New Jersey in the bark of the bole and larger branches of the host.

Dendroctonus frontalis Zimmermann, 1868, is native to the southern United States, where it is a primary enemy of pine (*Pinus*). It was evidently introduced into Honduras between 1910 and 1964. It occurs in the same trees with *D. mexicanus*, with which it is easily confused. A simultaneous introduction of *Pityophthorus confusus* Blandford apparently occurred. Recent collections (not seen) report this species from southeastern Mexico. If correct, these records indicate that this species reached Honduras by natural migration and not through commerce.

Gnathotrichus materiarius (Fitch, 1858) is native to eastern North America, where it is a secondary enemy of pine (*Pinus*). Shortly before 1936 it was introduced into France. Since then it has spread into neighboring areas, and may eventually occupy the entire pine belt of Europe and Asia. It is a wood-boring ambrosia beetle.

Hylastinus obscurus (Marshall, 1802) was introduced to North America (New York) from Europe sometime prior to 1878. By 1929 it had reached British Columbia and Oregon. It now occurs in all provinces and states where alfalfa or other forage clovers are grown.

Hypocryphalus mangiferae (Stebbing, 1914) is apparently native to India, but it has spread throughout the tropical regions of the world wherever its host, *Mangifera indica*, is cultivated. It was recorded from Guadeloupe Island in 1872 and was taken in Florida in about 1949. It is common throughout southern Mexico and Central America.

Hypothenemus aequaliclavatus Schedl, 1939, was named from Indonesia. A specimen was taken in Honduras in 1906 and another in Jamaica in 1967. Nothing more is known of this species.

Hypothenemus africanus (Hopkins, 1915) was named from South Africa, where it probably originated. Since 1933 it has been reported from Indonesia, Malaysia, Brazil, Venezuela, Jamaica, Bahama Islands, Do-

minican Republic, Puerto Rico, Honduras, Alabama, and Louisiana. It breeds in the twigs and fruiting pods of various trees, shrubs, and vines.

Hypothenemus areccae (Hornung, 1842) is apparently native to southeastern Asia. It now occurs in virtually all tropical and subtropical countries in the world. The first record of its occurrence in America was in Brazil in 1928. It now occurs throughout South America, Hawaii, Martinique, the Virgin Islands, Puerto Rico, the Bahama Islands, and southern Florida. It breeds in seeds, dry fruits, twigs, and in a wide variety of other materials. At times it becomes a serious pest of mature seeds and nuts and stored products.

Hypothenemus birmanus (Eichhoff, 1878) was named from Burma, where it probably is native. It has been reported from southeast Asia, Indonesia, the Philippine Islands, Australia, Micronesia, Hawaii, Jamaica, Central America, Mexico, and Florida. It breeds in the twigs and small branches of a wide variety of trees, shrubs, and woody vines. It was first taken in Jamaica in 1937 and in Florida in 1951.

Hypothenemus brunneus (Hopkins, 1915) occurs from Alabama, Florida, and Texas to Panama, including the Bahama Islands, Cuba, Puerto Rico, the Virgin Islands, and Trinidad. It has no native American relatives, but several similar species are native to Africa. For this reason it is presumed to be of African origin. It was first reported from Texas in 1915.

Hypothenemus californicus Hopkins, 1915, was regarded as a native North American species until specimens were taken recently in Liberia and Israel. Since it is not allied to any American species, but has several near relatives in Africa, it is presumed to be of African origin. It occurs from southern California to New Jersey and southward to southern Mexico.

Hypothenemus columbi Hopkins, 1915, was named from the southern United States and has since been reported from Mexico, Costa Rica, Colombia, Venezuela, Cuba, and the Bahama Islands. All representatives of this species group are of Old World origin. It is presumed that this species also

will eventually be found in Africa. It breeds in a wide variety of materials, including twigs, weeds, straw, seeds (rare), etc. It is of some economic importance.

Hypothenemus crudiae (Panzer, 1791) was named from India, but it has spread through commerce to virtually all tropical and subtropical areas of the world for so long that its true origin is unknown. It is common from the eastern United States to Argentina. Circumstantial evidence suggests a southern Asian origin. Although it breeds in small branches of trees, shrubs, vines, weeds, or other plants, its greatest populations occur in seeds, pods, or other fruiting bodies, where it has caused much economic damage in mature seeds both in the field and in storage. Its importance in agriculture or forestry is limited to its effect on seed production.

Hypothenemus cylindricus (Hopkins, 1915) was named from Guatemala, but is now known from Mexico to Panama, Colombia, Venezuela, Guadeloupe, and Africa (Liberia). Since this species has no close relatives native to America, it is presumed that it is of African origin where several near relatives occur. It breeds in small branches of trees, shrubs, and vines.

Hypothenemus erectus LeConte, 1876, was named from Texas, but it is now known from Texas to Honduras, Venezuela, Cuba, the Virgin Islands, and Africa. Several very closely related forms occur in Africa, but there are no known native American species that are closely related. For this reason it is presumed to be of African origin. It breeds in small branches of a wide variety of trees and shrubs.

Hypothenemus eruditus Westwood, 1836, is probably the most widely distributed and most frequently encountered scolytid species in the world. It is known from virtually all tropical and subtropical areas of the world and in temperate regions where sufficient moisture and vegetation are present. It breeds in the bark of the trunk or branches of numerous plants, in flowers, weeds, grass, fruiting bodies of fungi, and seeds; the original series was breeding in the cover of an old book. In America it is known from Michigan to Argentina as a common spe-

cies. It probably originated in the American tropics. It is frequently of economic importance in mature seeds or pods both in the field and in storage.

Hypothenemus hampei (Ferrari, 1867) is the notorious coffee berry borer. It is apparently native to Africa, but it occurs throughout the coffee-growing regions of the Old World and in Brazil. More recently it has reached Colombia and Guatemala. It breeds only in coffee beans. Infested beans have been intercepted in most countries of the world. It is of great economic importance.

Hypothenemus javanus (Eggers, 1908) was named from Indonesia, although it may have originated in Africa. It is now known from Africa (Camerouns, Congo, Ghana, and Liberia), Indonesia, the Philippines, Mexico to Panama, Colombia, Venezuela, Guadeloupe, Puerto Rico, Cuba, and Florida. It breeds in small branches and seed pods of a wide variety of plants. It has been of economic concern in some situations.

Hypothenemus obscurus (Fabricius, 1801) originated in the American tropics. It breeds from Costa Rica and Puerto Rico to Brazil, but has been intercepted in seeds and nuts in most countries of the world. It is best known as a borer in Brazil nuts, although it breeds in a wide variety of seeds and dry fruits and, apparently, can reproduce in bark (uncommon). It is an important pest of many tropical nuts and fruits. Breeding populations in Florida apparently hybridize with the native *H. seriatus* (Eichhoff) and are absorbed by that species.

Hypothenemus parallelus (Hopkins, 1915) was named from Mexico, where it may have originated. It is also known to occur in Hawaii. It is very similar to *H. eruditus* Westwood, and may be no more than a morphological variation of that species.

Hypothenemus pubescens Hopkins, 1915, was named from Florida, but it is now known to occur in Texas, Puerto Rico, Mexico, and Hawaii. Because of its very small size and its unusual habit of breeding in the fruiting stalks of grass (*Andropogon*, *Cynodon*, and *Paspalum*) it probably has been overlooked. An American origin is suspected.

Hypothenemus seriatus (Eichhoff, 1871) was named from Louisiana. It occurs from West Virginia to Brazil, Hawaii to Australia, Indonesia, Madagascar, and Africa (the Ivory Coast). It is probably of American origin. It breeds most commonly in twigs and small branches, but may also occur in seeds, pods, weeds, or other plant material. It is of economic concern.

Hypothenemus setosus (Eichhoff, 1867) was named from Guadeloupe, although it is probably native to Africa. It occurs from Mexico to Brazil, Guadeloupe, Puerto Rico, and Africa (Camerouns, Congo). It breeds in small branches and fruiting bodies of a wide variety of hosts.

Ips grandicollis (Eichhoff, 1868) occurs from southern Manitoba and Quebec to Florida and Honduras. It was introduced into pine plantations in Australia. It is of economic concern.

Microborus boops Blandford, 1897, is a rare species that is known from Guatemala to Panama. Its occurrence in Jamaica probably represents an introduction. It was also introduced into Africa (Camerouns, Gold Coast, Uganda) prior to 1919.

Pagiocerus frontalis (Fabricius, 1801) probably originated in southern South America, where similar species occur. It has spread northward in America to North Carolina and Texas, and it is occasionally intercepted in corn (maize) in Europe and elsewhere. In the Andean region of South America it is a significant pest of dry mature corn in the field and in storage.

Phloeosinus cupressi Hopkins, 1903, is native to the coastal region from Alaska to California, where it breeds in *Cupressus* and a few related tree genera. It has been introduced into Panama, Australia, and New Zealand.

Pityophthorus confusus Blandford, 1904, is apparently native to the southeastern United States, where it occurs in *Pinus* holes with *Dendroctonus frontalis* Zimmerman. It appears to have reached Honduras with *D. frontalis* either by natural migration or through commerce (see *D. frontalis* above).

Pityophthorus juglandis Blackman, 1928, infests native black walnut (*Juglans*) in

southern Arizona and New Mexico. It was reported as new to California by Bright and Stark (1973). Since native potential hosts occur in the area, there is a question as to whether an oversight in collecting prior to 1959 occurred or an introduction actually did occur.

Premnobius cavipennis Eichhoff, 1878, is native to Africa, where it is a common, widely distributed species. Prior to 1931 it was introduced into South America and has now spread northward to southern Mexico (1951) and Florida (1939). It is an ambrosia beetle that breeds in a wide variety of hosts in material about two to eight inches in diameter. It may be of some economic concern.

Premnobius ambitiosus (Schaufuss, 1897) has not yet been reported from North or Central America, although it probably occurs there. It is native to Africa, but was introduced into Brazil and Colombia prior to 1958. It is now known from Bolivia and has probably reached most other South and Central American countries. Its habits and importance apparently are similar to those of *P. cavipennis*.

Scolytus mali (Bechstein, 1805) is native to Europe, where it is a pest of apples, pears, prunes, and other cultivated fruit trees. It was introduced into New York prior to 1868 but was virtually unknown here until about 1950. Since then it has spread into southern Ontario, Michigan, Ohio, and Maryland and should spread into most of the states in the U.S.A. within a few years. It is larger than *S. rugulosus*, but apparently has similar habits.

Scolytus multistriatus (Marsham, 1802) is native to temperate Europe and Asia. It was introduced into North America and now occurs in all of the 48 contiguous states of the U.S.A. and is apparently in all of the southern provinces of Canada. It is the well-known European elm bark beetle, the principal vector of Dutch Elm Disease. It has also been introduced into several other areas of the world where elms grow.

Scolytus rugulosus (Müller, 1818) is the shot-hole borer of cultivated fruit trees. It is native to Europe and Asia, but it was introduced into North America very early in

the settlement of this continent and now occurs in all states and provinces where apples are grown.

Xyleborinus aspericauda (Eggers, 1941) is native to Central and South America. One specimen was taken in the field in southern Florida (Biscayne Bay). Whether or not it is established in Florida is not known. It is an ambrosia beetle that breeds in the limbs and logs of a wide variety of host plants.

Xyleborinus saxeseni (Ratzeburg, 1837) is native to Europe, but has been transported to most temperate areas of the world. In North America it has been reported from 33 states of the U.S.A., from British Columbia, and from Baja California. It is probably more widely distributed, but has been overlooked due to the lack of collecting. It was also intercepted in Australia in logs from Brazil and it has been in Hawaii for many years. In desert areas it is of little or no economic concern, but may be a significant pest elsewhere.

Xyleborus affinis Eichhoff, 1868, is probably native to tropical America, but now occurs from Massachusetts to Argentina, from Hawaii to Malaya, and in Africa. It breeds in injured, dying, and cut trees and is a significant pest of logs. It does not normally breed in sawed lumber.

Xyleborus dispar (Fabricius, 1792) is native to Europe, but was introduced into North America prior to 1817. It is now widely distributed in southern Canada (Nova Scotia to British Columbia) and in the northern United States (south to Virginia and Utah). It is an ambrosia beetle that breeds in a wide variety of hosts in material two to ten inches in diameter. It is of economic concern in some areas.

Xyleborus ferrugineus (Fabricius, 1801) probably originated in tropical America, but it has now spread to Arizona, Michigan, and Massachusetts in the continental United States, as well as Hawaii, Micronesia, Australia, and Africa, and may have reached other tropical areas where it has not yet been detected. Its habits are similar to those of *X. affinis* except that it is more aggressive and more abundant and, consequently, is of greater economic concern.

Xyleborus obliquus (LeConte, 1878) was

named from Florida, but it is probably of South American origin where it and similar species occur. It now occurs from Virginia to Brazil and in Africa (Congo and Zambia). It apparently breeds in unthrifty or cut branches of a wide variety of hosts. In the United States it has been reported from the District of Columbia, Florida, Georgia, Mississippi, and Virginia; in Mexico from Michoacan; in Central America from Guatemala; and in South America from Colombia and Brazil.

Xyleborus rubricollis Eichhoff, 1875, is native to southeastern Asia from Malaya to Japan. It was introduced into the United States prior to 1942, where it has been reported from Connecticut, Maryland, and Virginia. It is an ambrosia beetle that breeds in a wide variety of hosts. It may be of local economic concern in some areas.

Xyleborus spinulosus Blandford, 1898, is native to tropical America from central Mexico to Brazil. It was introduced into Hawaii prior to 1934. It breeds in the branches of a wide variety of host trees, shrubs, and woody vines.

Xyleborus validus Eichhoff, 1875, was named from Japan; it has also been reported from Taiwan and China. About 1975 it became established in New York. In recent years it has been intercepted from wooden packing crates of Japanese origin at numerous ports worldwide. It is anticipated that it will become established in additional areas in the near future.

Xyleborus volculus (Fabricius, 1775) occurs in two geographical races that probably ranged from the coastal southeastern United States to Argentina. One or both races, including hybrids between the two, have spread to Hawaii, Micronesia, Australia to Malaya, Africa, and Madagascar. Its habits are similar to *X. affinis* and *X. ferrugineus* except that it is usually less abundant. It is of some economic concern.

Xyleborus xylographus (Say, 1926) is native to eastern North America from Ontario and Quebec to the Gulf Coast and Cuba. A few very old specimens labeled "Brazil" and "Chile" have been examined, but they are assumed to be mislabeled. One specimen from China Flat, Eldorado County,

California (1948), apparently represents a new introduction. It breeds in *Quercus*, rarely in other trees.

Xylosandrus compactus (Eichhoff, 1874) occurs from Hawaii to Sri Lanka (Ceylon) and Japan, Africa, Cuba (1958), Mississippi (1968), Georgia (1975?), and Florida (1941). It is probably of Asian origin. It is an aggressive primary borer in new, vigorous twig terminals in a wide variety of hosts. It has significant economic importance. When I reported the identity of this species personally in 1952 to United States Department of Agriculture officials, I was told: "Suppress the information. We already have too many problems to worry about." At the time, its distribution was very local in Florida and eradication would have been comparatively simple. It is widely known as the black shot-hole borer. It may be of extreme economic importance in some areas.

Xylosandrus crassiusculus (Motschulsky, 1866) is native to the Indo-Malayan region. It now occurs in Africa, Hawaii, Australia, and South Carolina (1974). It is an ambrosia beetle that breeds in branches and limbs of a wide variety of hosts. It has some economic importance.

Xylosandrus germanus (Blandford, 1894) was named from Japan. It was introduced into the United States prior to 1931 and it now occurs from Illinois and Connecticut to West Virginia. It breeds in a wide variety

of hosts from the branches to the stump. It may be of local economic concern.

Xylosandrus morigerus (Blandford, 1894) is native to southeastern Asia and Indonesia. It was introduced into America prior to 1959 and now breeds from Mexico (Veracruz) to Colombia and Venezuela. It has been intercepted in ports of entry in Arizona, California, and New Jersey, but breeding populations are not yet known from the United States. It is an ambrosia beetle that breeds in small stems of a wide variety of trees, shrubs, vines, and herbaceous plants. It has some economic importance. It is widely known as the red shot-hole borer.

Xylosandrus zimmermanni (Hopkins, 1915) is probably native to northern South America and Central America. It apparently was introduced into southern Florida prior to 1915. It is rather uncommon in small branches of trees, shrubs, and vines of a wide variety of plants. It is of minor economic concern.

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