The North American Species in Group X of *Ips* De Geer (Coleoptera: Scolytidae)[1]

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Abstract *Canad. Ent.* 97: 803–809 (1965)

Ips calligraphus (Germar), *I. ponderosae* Swaine and *I. interstitialis* (Eichhoff) represent one variable species with the oldest name, *Ips calligraphus* (Germar) taking precedence. *Ips calligraphus* can always be recognized by the six spines on each side of the declivity. All other species in North America have less than six spines on each side.

This paper is the last of a series on the *Ips* of North America (Hopping 1961; 1962; 1963a, b, c, d, e; 1964; 1965a, b, c, d). The six-spined *Ips* of Group X are represented in North America by a single species, *Ips calligraphus* (Germar). Although the size varies greatly even within local populations, only minor and inconsistent differences occur in other characters.

Ips calligraphus (Germar)

Bostrichus calligraphus Germar, 1824, Ins. Spec. Nov.: 461.
Bostrichus exesus Say, 1826, *J. Acad. Nat. Sci. Philad.* 5: 255.
Bostrichus chloroticus De Jean, 1837, *Dej. Cat.*: 232.
Bostrichus conformis De Jean, 1837, *Dej. Cat.*: 232.
Tomicus praemorsus Eichhoff, 1867, *Berl. ent. Z.* 11: 401.
Tomicus interstitialis Eichhoff, 1868, *Berl. ent. Z.* 12: 273. *New Synonymy.*
Ips calligraphus: Smith, 1900, *Cat. Ins. N.J.*: 363; Swaine, 1909, *Bull. N.Y. St. Mus.* 134: 120; Swaine, 1918, *Bull. Can. Dep. Agric.* 14(2): 107, 112; Chamberlin, 1939, Bark and Timber Beetles of N.A.: 410, 416; Hopping, 1963, *Canad. Ent.* 95: 516.
Ips ponderosa Swaine, 1925, *Canad. Ent.* 57: 197. *New Synonymy.*

I. calligraphus is 3.5–6.5 mm. long and 1.2–2.2 mm. wide (Fig. 1). Fully pigmented adults are black with dark brown legs and antennae.

The female has the front of the head slightly and evenly convex, granulate-setose with the areas between granules usually smooth and shining; a median tubercle is situated at a distance equal to the width of the eye above the epistomal margin (Fig. 2).

The pronotum is slightly more than 1.2 times longer than wide, having the sides slightly and evenly arcuate from the base to the apical fourth where they are obtusely angled to the broadly rounded front margin; lunar rugosities extend to slightly behind the centre of the pronotum and farther back on the sides; punctures on the caudal median portion vary from fine (0.02 mm. in diameter) on some individuals to medium coarse (0.04 mm. in diameter) on others, becoming denser and coarser (0.05 mm. in diameter) towards the lateral margins.

Elytra are 1.5 times longer than wide, having the lateral margins sub-parallel from the base to about the caudal fifth where they are gradually rounded inward to the margins of the declivity. Striae are moderately impressed making the interspaces slightly convex; strial punctures are coarse, 0.05 mm. in diameter and separated by this distance or less. The first interspace is uniseriately punctate-setose with granules almost obsolete except near the declivity; the second interspace is usually punctate-setose with the line of punctures usually along the inner edge of the interspace near the strial punctures; the third interspace is often impunctate except near the declivity; the remaining interspaces are more regularly, uniseriately punctate-setose, the punctures being closer together than on the interspaces nearer the suture. The first declivital spine is about 0.07 mm. long, conical, slightly curved and acute at the tip; the second spine is also conical, sub-acute at the tip and twice the length of the first when the broad tumescent base is included; the third spine is similar in shape to the second but much stouter, more rounded at the tip and asymmetrical because the tumescent base is extended on one side to the base of the second spine; the fourth spine is a little longer than the second, slightly more cylindrical, with a conical sub-acute tip; the fifth spine is similar to the fourth but a

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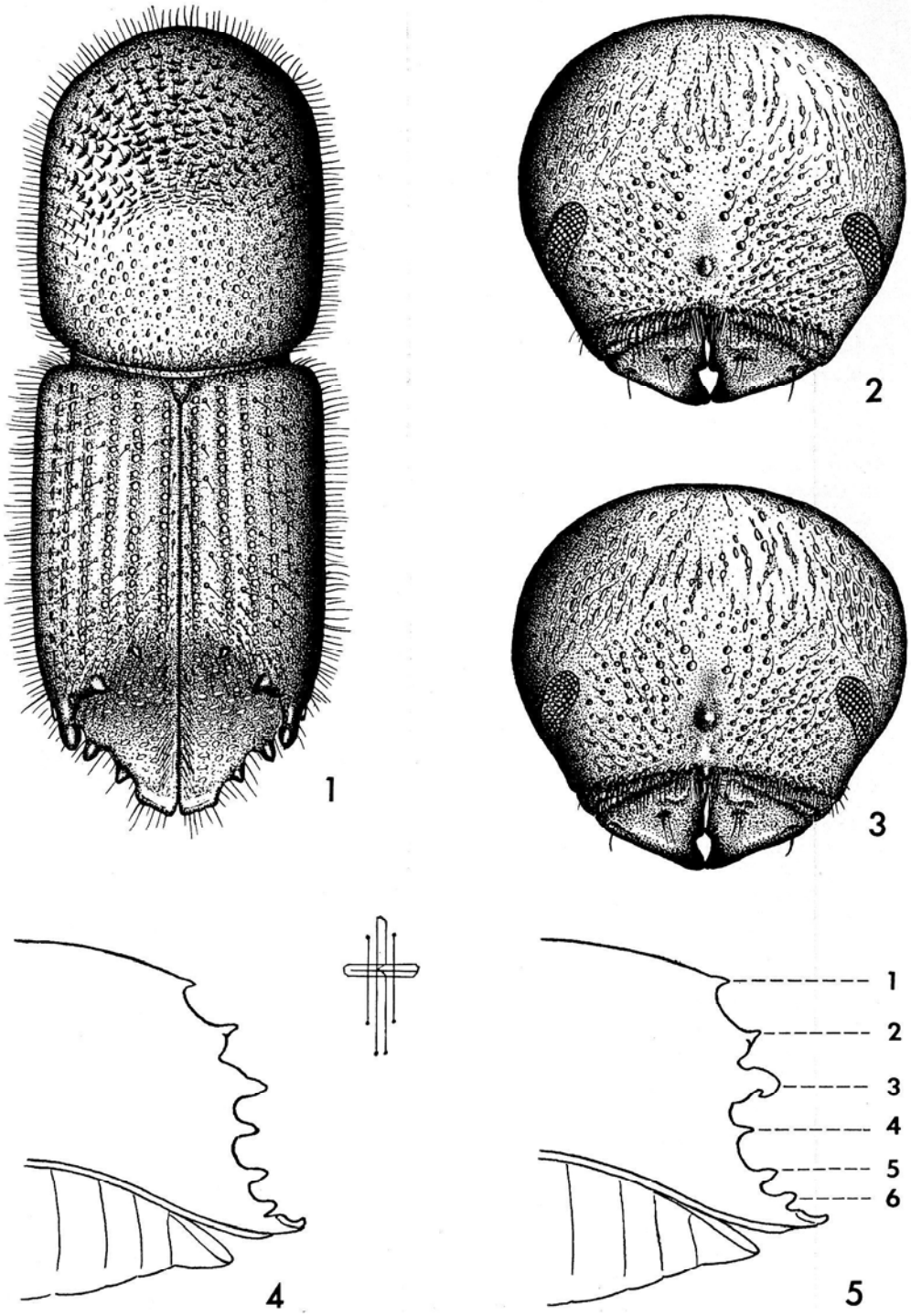

Figs. 1–5. The *Ips* of Group X. 1, *I. calligraphus* (♂) Germar; 2 (♀), 3(♂), front of head; 4 (♀), 5 (♂), declivital spines (lateral).

Fig. 6. Galleries of *Ips calligraphus* (Germar). U.S. Forest Service photo.

little larger; the sixth spine is a stout cone considerably shorter than the fifth spine (Fig. 4); the caudal edge of each elytron is emarginate. Punctures on the declivity are slightly smaller than strial punctures and the elevated sutural margins are granulate-setose. The ventral punctation is about the same as in the five-spined *Ips*, the diameter of a puncture on the anterolateral portions of the metasternum being about 0.02 mm. in diameter and the surface between punctures microreticulate (magnification × 50).

The male differs from the female by having a larger median tubercle on the frons (Fig. 3), usually coarser punctation and having a larger third declivital spine which has a notch on the ventral side resembling a crochet hook (Fig. 5). It is similar to the third spine of the five-spined *Ips*.

I. calligraphus occurs in eastern Canada, throughout most of the United States, south to Honduras and on some Caribbean islands (Fig. 7). Caleda and Veracion (1963) reported that *Ips interstitialis* has been established in the Philippine Islands where it attacks *Pinus insularis* Endl. The type locality of *I. calligraphus* is Kentucky. The gallery pattern is shown in Fig. 6.

Specimens have been seen from Halifax in **Nova Scotia;** Montreal in **Quebec;** Toronto, 1000 Isles, Ottawa, Algonquin Pk., Port Hope and Sudbury in **Ontario;** Durham and Pelham in **New Hampshire;** West Point, Bath, Buffalo, Ithaca, Islip, Lansingburg, Saratoga Sprgs., Hamburg and Syracuse in **New York;** North

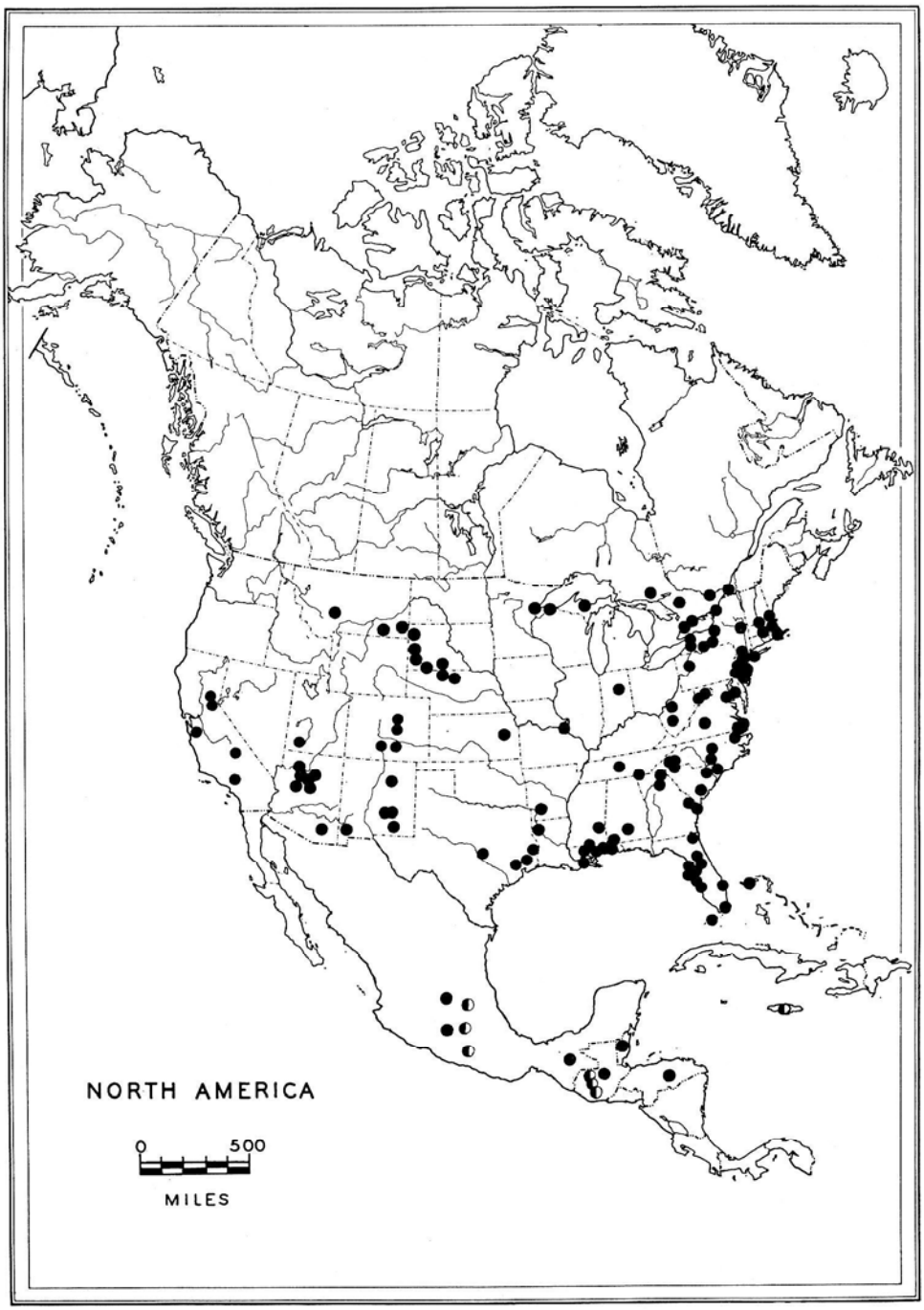

Fig. 7. Distribution of *Ips calligraphus* (Germar). ● Specimens seen. ◐ Reported.

Saugus, Berlin and Berkley in **Massachusetts;** Lakehurst, Iona, Clementon, Riverton, South Amboy and New Foundland in **New Jersey;** Frankford, Philadelphia, Pocono Lake and Clarion Co. in **Pennsylvania;** Bladensburg and College Park in **Maryland; District of Columbia;** Norfolk, Arlington, Va. Beach and Nelson Co. in **Virginia;** Kanawha Sta., Hampshire, Wood Co. and Grant Co. in **West Virginia;** Asheville, Fayetteville, Fletcher, Boardman, Tryon, Edenton and Raleigh in **North Carolina;** Mississippi City, Baxterville, Meridian, Nicholson, Biloxi and Ocean Sprgs. in **Mississippi;** Grand Bay, Calhoun, Mobile and Gadsden in **Alabama;** Nashville and Chatanooga in **Tennessee;** Wainsville, Clayton, Tybee Is. and Savannah in **Georgia;** Barto, Winter Park, Tampa, Jackson, Tarpon Sprs., Sanford, Palm Beach, Punta Gorda, Elfers, Oneco, Key West, Key Largo and Paradise Key in **Florida;** Marquette in **Michigan;** Mineral Springs in **Indiana;** Douglas Co. in **Kansas;** St. Louis in **Missouri;** Dierks in **Arkansas;** New Orleans, Shreveport and Bogalusa in **Louisiana;** Duluth in **Minnesota;** Bayfield in **Wisconsin;** Pine Ridge, Nenzel and Valentine in **Nebraska;** Harney N. F., Black Hills, Rosebud Indian Agency, Camp Crook, Nemo, Elmore and Whitewood in **South Dakota;** Lamedeer, Clancy and Ekalaka in **Montana;** Beulah, Colo. Springs, Husted, Glenhaven and San Isabel Nat. For. in **Colorado;** Zion Canyon in **Utah;** Placerville, Grass Valley, Palo Alto, Fresno Co., and Pasadena in **California;** Grand Canyon, Flagstaff, Prescott, Williams, Coconino N. F., Santa Catalina Mts. and San Francisco Mts. in **Arizona;** Meek, Las Vegas, Capitan Mts., Chiricahua Mts., Lincoln Nat'l. For. and Peloncillo N. F. in **New Mexico;** Houston, Kirbyville, Bastrop, Harvester and Anahuac in **Texas;** Temascaltepec in the **State of Mexico;** Zimapan in **Hidalgo;** Altamirano in **Chiapas;** San Geronimo in **Guatemala;** Salama in **Honduras; British Honduras;** Grand Bahama Isl. in the **Bahamas;** 891 specimens were seen.

Schedl (1955) gave the following localities for *I. interstitialis.* Mexico: Jonocatepec in Morelos; Jacala in Hidalgo; Omiltene in Guerrero. Guatemala: San Geronimo, San Joaquin, Sierra de Chuacús, Sierra de las Minas, Estancia la Virgina, S. Tartin Jilotepeque, Guatemala Ciudad, Road Quelzaltenango-Huehuetenango behind Chiquival; Road Quelzaltenango-Huehuetenango (Rancho Alegre), Las Trohadas, Finca La Concepcion bei San Juan Sac, Poptún, Cuchumatanes; also Salama (British Honduras) and Jamaica.

Known hosts are *Pinus strobus* L., *P. taeda* L., *P. rigida* Mill., *P. palustris* Mill., *P. resinosa* Ait., *P. pungens* Lamb., *P. echinata* Mill., *P. virginiana* Mill., *P. flexilis* James, *P. ponderosa* Laws., *P. occidentalis* Sw., *P. montezumae* Lamb., *P. oocarpa* Sch. and *P. pseudostrobus* Lindl.

The location of the type of *I. calligraphus* is unknown to me. The concept of the species is based on the original description which clearly indicates a six-spined *Ips* and on material in the U.S. National Museum, Canadian National Collection, California Academy of Sciences and the Leconte Collection at Harvard University.

The size of adults of *I. calligraphus* varies rather surprisingly even within a series from one locality although the proportions remain relatively constant (Table I). Those from Grass Valley, California, for instance, vary greatly in size while those from Prescott, Arizona, show less variation although this may be due to the small number in the series. Similarly, small series from Mexico and Guatemala do not exhibit marked variation in size. However, Blandford (1895) said of *I. interstitialis,* "A long series of this species was taken by Mr. Champion, the examples varying in colour from pale testaceous to ferruginous, and in size from 3.6 to 5.4 mm." Specimens from Guatemala and Honduras are indistinguishable from those of comparable size from Grass Valley, California, or

TABLE I
Comparative measurements of *Ips calligraphus*

Locality	No. of specimens	Length, mm.			Ratio: pronotum length over width		
		Max.	Min.	Mean	Max.	Min.	Mean
Grass Valley, California	30	5.99	3.94	5.01	1.33	1.17	1.25
Prescott, Arizona	10	6.43	5.67	6.10	1.27	1.15	1.23
Asheville, North Carolina	18	5.51	4.48	4.54	1.30	1.18	1.24
Altamirano, Chiapas	9	4.81	3.51	4.26	1.37	1.21	1.27
Zimapan, Hidalgo	9	5.79	4.97	5.38	1.26	1.15	1.21

Asheville, North Carolina. Specimens from the midwestern and southwestern United States tend to have coarser punctation medially on the caudal part of the pronotum than those from other regions. This and the larger average size were the main characters used by Swaine (1925) to distinguish *I. ponderosae*. Both of these characters are seen to be variable when large series are available.

The males of *I. calligraphus* are easily distinguished from females by the ventral notch in the large third spine (Fig. 5). This is absent in the female and the spine is of an entirely different shape (Fig. 4). It is more difficult to distinguish the sexes in some of the five-spined *Ips* because the third spine is similar in both sexes. However, in most *Ips* species that breed in pine, the pars stridens of the sound-producing mechanism is present toward the back of the head in the female (Wood 1961). This is a reliable character to distinguish the sexes when the head is bent far enough forward to disclose it. Unfortunately many mounted specimens have the head sufficiently retracted to hide this character. Females of most species that breed in spruce do not have this type of sound-producing mechanism.

I. calligraphus is closely related to *Ips sexdentatus* Boerner of Eurasia. The latter differs consistently by having the third declivital spine capitate and not notched on the ventral side as in *I. calligraphus* (Fig. 5). *I. sexdentatus* has a transverse carina on the frons, sometimes divided into several shorter carinae, a character entirely lacking in *I. calligraphus*. These species suggest parallel evolutionary development from parent stock originating somewhere in the early circumpolar forest.

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