

REVISION OF THE GENUS *SINOXYLON* DUFTSCHMID, 1825  
(COLEOPTERA, BOSTRICHIDAE) WITH NEW RECORD OF SPECIES  
IN THE MIDDLE OF IRAQ

Ekhlas Abdul Jabbar Budiewi\* Radhi F. Al-Jassany\*  
and  
Razzaq Shalan Augul\*\*

\*Department of Plant Protection, College of Agriculture, University of  
Baghdad, Iraq

\*\*Iraq Natural History Research Center and Museum, University of  
Baghdad, Iraq

Corresponding author e-mail: [abdekhlas1@gmail.com](mailto:abdekhlas1@gmail.com)

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ABSTRACT

In this study; the genus of *Sinoxylon* Duftschmid, 1825 (Coleoptera, Bostrichidae) was revised. There were 3 species registered in our investigations: *S. anale* Lesne, 1897; *S. ceratoniae* (Linnaeus, 1758) and *S. muricatum* (Olivier, 1790), the last species was redescribed as being found for the first time for the Iraqi faunal insects. Key to the species were constructed and supported by figures of the main diagnostic characters and some morphological features.

Keywords: Auger beetles, Bostrichidae, Coleoptera, Iraq, *Sinoxylon*.

INTRODUCTION

Auger beetles (Coleoptera, Bostrichidae), also known as false powderpost beetles, are economically important and can extensively damage dried and seasoned wood and wooden artifacts through the boring behavior of both adults and larvae (Ivie, 2002; Peters *et al.*, 2002; Akhter, 2005); these beetles are frequently transported through countries, particularly in wood packing materials (Haack, 2006); they are represented by 616 species in the worldwide (GBIF Secretariat, 2019).

Most wood-boring bostrichids attain nutrition from starch, enabling many species to utilize almost any dry wood material from an enormous host range (Ivie, 2002). The genus *Sinoxylon* Duftschmid, 1825 contains 52 species that are worldwide distributed (GBIF Secretariat, 2019). The members of this genus are typically not considered primary pests; also they utilize a broad variety of hosts that contain numerous trees, shrubs, and herbaceous plants (Filho *et al.*, 2006). *Sinoxylon* damage is typically caused by the boring of adults and larvae in the stems, branches, or twigs of dead trees (Nair, 2007).

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This genus characterized by: intercoxal process of first abdominal sternite broader with a ventral face; metepisternum more broadly truncate from behind with metepimeron widely separated from metasternum; mandibles short and blunt, meeting along midline, with directly opposable cutting edges; antennal club with flabellate shaped or with strongly transverse segments; and declivity of elytra with two strong spines in middle close to or on suture (Liu *et al.*, 2008).

In Iraq, there are two species recorded only; *Sinoxylon anale* Lesne, 1897 (Knopf, 1971) and *S. ceratoniae* Linnaeus, 1758 (Al-Ali, 1977); this paper provides more details on the insect fauna of Iraq.

### MATERIALS AND METHODS

Specimens used in this investigation were collected during the surveys of some Iraqi regions throughout 2019.

Totally 124 specimens were collected by the direct method and it involved the removal of the damaged parts of trees and Shrubbery from different regions in Baghdad, Saladin and Diyala provinces; the specimens were put in vials and transferred to the laboratory; 10 males for each species were dissected to separate the genitalia and examined under a dissecting microscope, named of the part of male genitalia according to Borror *et al.* (1989); the rest specimens are mounted on small cards and stored in insect box.

Images of adults and genitalia were taken using a Dino-Lite Digital Microscope and Samsung galaxy J713Mp. The keys of Lesne (1906), Fisher (1950) and Arnett *et al.* (2002) are used to identify the specimens, and reformulated to be compatible with the diagnosis of the species belonging to the genus of *Sinoxylon* in Iraq.

All examined species are deposited in Iraq Natural History Research center and Museum, University of Baghdad.

### RESULTS AND DISCUSSION

During this investigation, there are three species registered: *Sinoxylon anale* Lesne, 1897; *S. ceratoniae* (Linnaeus, 1758) and *S. muricatum* (Olivier, 1790); the last species was re-described as a new record to faunal insects of Iraq.

A Key to the species of *Sinoxylon* was constructed with a re-description of the new recorded species.

#### Key to species of *Sinoxylon*:

- (1) Declivity with three different tubercles on end of each elytron (Pl. 1A) ..... *S. muricatum*  
- Declivity with one tubercle on each elytron (Pl. 1 B, C)..... 2
- (2) Declivity with clearly emarginated; elytra with distinct wide yellowish–brown color area (Pl. 1B) ..... *S. anale*  
- Declivity without emarginated; elytra wholly black or without distinct colored area (Pl. 1C) ..... *S. ceratoniae*

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***Sinoxylon muricatum*** (Linnaeus, 1767)

Synonyms: *Apate bidens* Fabricius, 1798

*Apate sexdentata* (Olivier, 1790)

*Bostrichus chalcographus* Panzer, 1794

*Bostrichus sexdentatus* Olivier, 1790

*Dermestes muricatus* Linnaeus, 1767

*Sinoxylon sexdentatum* (Olivier, 1790)

*Trypocladus sexdentatus* (Olivier, 1790)

Description: small beetles (Pl. 2), length 4-5 mm; male and female similar in color and variation. Head black, body dark-brown color with exception antennae and tarsi light-brown, but there were many variations in some specimens appeared less frequently: part of them reddish-brown while less specimens in black color. Body covered with moderate density, relatively short and semi-erect whitish-yellow hairs, and appear more clearly on abdominal surface; hairs longer on front. Eyes prominent spherical shaped; mandibles short and sharp; antennae lamellate and consist of 10 segments; lamellate part compose of three segments equal in length, first segment semi-triangular shaped, these segments more wide compared to their length (more twice than length) (Fig. 1 A).

Pronotum clearly convex and sides broadly rounded, slightly wider than long; from above, pronotum appear consisting of two areas: anterior part equal 1.25 times than posterior part, and showed with unciform shaped and large teeth on anterio-lateral edges, smaller at the middle area, absent at near head, surface appeared roughly; posterior part with coarsely sculpture composed of moderate punctures, that leaving clearly and shiny and narrowed interspaces (Fig. 1 B); scutellum triangular shaped.

Legs relatively short, generally covered with short and whitish-yellow hairs; fore coxae with flask-shaped; mid coxae semi-spherical and hind coxae with slightly triangle shaped; trochanters semi-triangular shaped; apical tibiae with two spines and spur, internal surface of fore tibiae clothed with golden, dense, thick and short decumbent setae that gradually increases in length towards the apical part. Posterior surface with some teeth that vary in size and leave different spaces between them; tarsi with five segments, first tarsomere shorter, whereas the second longer than the others; pretarsus composed of two claws (Fig.2).

Elytra longer about 1.5 times than pronotum; punctures of elytra slightly larger than pronotal punctures and leaving obviously interspaces; declivity of each elytron with one short costiform tubercles at anterior margin of apical declivity; and with two large conical tubercles located transversely at middle of declivity, inner one long and spiny-liked shaped, sharp and acute apically, whereas outer tubercle shorter, thicker and obtuse at apex (Pl. 1A).

Abdomen of male with exposed seven tergites, the first six transversely shaped, third widest while the wide decrease from four toward terminal tergites; seventh tergite longest; eighth tergite as elongated and narrowed W- shaped like, with apical notch medially, ending with row and finely hairs (Fig. 3A). Ventrally, five sternites exposed, (first one combined 1+2 sternites); all sterna covered by dense, short and decumbent hairs (Pl. 3 A). Last exposed sternite distinctly acuminate and ended with row long hairs; seventh sternite with rounded apex, base with short and wide W- shaped like; apical margin covered with hairs like as in

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eighth tergite (Fig. 3 B). Male genitalia or aedeagus simple, elongated aedeagus, narrowed and question mark shaped-like which consist of three parts: basal piece, small, short and thick part; second part as a tube shaped called a tegmen containing inside it the third part, called median lobe, tegmen with tapering apical part covered with fine hairs (Fig. 3 C).

Abdomen of female (Pl. 3 B) different from male by: the last exposed sternite (5<sup>th</sup> sternite) more transversely and clearly wider than male; also the different shape between the 8<sup>th</sup> tergite and 7<sup>th</sup> sternite, moreover, abdomen of female with additional tergite and sternite; 9<sup>th</sup> tergites and 8<sup>th</sup> sternites (Fig.4). Female genitalia composed of three pairs of valves; outer, median and inner valves, the first pair characterized by a short part (Pl. 4).

Materials examined: Bagdad, Al Taji, on dry twigs of fig trees (Pl. 5 A) 15♂♂, 35♀♀, 7.ix. 2019. Saladin, Balad, on dry twigs of fig trees, 20♂♂, 17♀♀, 26.viii. 2019.

Distribution: according to Borowski and Węgrzynowicz (2007), this species is distribute in: Africa: Algeria, Egypt, Libya, Morocco, Tunisia; Europe: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Canary Islands, Croatia, France, Germany, Greece, Hungary, Italy, Portugal, Russia, Sardinia, Sicily, Spain, Ukraine; North America: United States of America; Asia: Azerbaijan, Cyprus, Israel, Syria, Turkey.

***Sinoxylon anale*** Lesne, 1897 (Pl. 1B)

Synonyms: *Apatodes macleayi* Blackburn, 1889

*Sinoxylon geminatum* Lesne, 1897

Materials examined: Baghdad, Abu- Ghraib, collected from twigs of jujube trees (Pl. 5 B), 18♂♂, 7♀♀, 25. vii. 2019; Al Taji, collected from dry twigs of fig trees, 5♂♂, 26.ix.2019.

Distribution: Iraq (Knopf, 1971); India, Sri Lanka, Saudi Arabia, Southeast Asia, South of China, Philippines, Australia, Indonesia and New Zealand, USA (Lesne,1906; Fisher, 1950); Australia (Borowski and Węgrzynowicz, 2007).

***Sinoxylon ceratoniae*** (Linnaeus, 1758) (Pl.1 C)

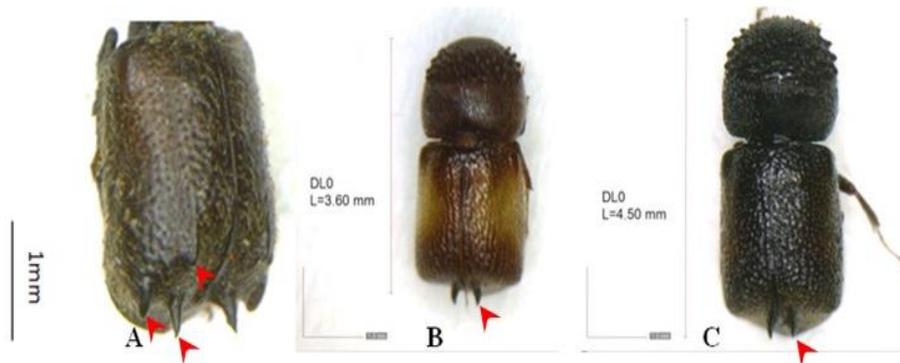
Synonyms: *Apate diaspis* Fairmaire in Gestro, 1895

*Sinoxylon bicuspidatum* Ancey, 1879

*Scarabaeus ceratoniae* Linnaeus, 1758

Materials examined: Baghdad, Abu- Ghraib, collected from twigs of jujube trees, 5♂♂, 25. vii. 2019; Jaddria, collected from dry twigs of mulberry tree (Pl. 5 C), 1♂, 26.ix.2019. Diyala, Al Wajehiya, collected from dry twigs of fig tree, 1♂, 28.viii.2019.

Distribution: Iraq (Al- Ali, 1977); Africa: Algeria, Egypt, Libya, Morocco, Tunisia, Europe: Germany, Sweden, Asia: Oman, Saudi Arabia, United Arab Emirates, Yemen (Borowski and Węgrzynowicz, 2007; Löbl and Smetana, 2007).



**Plate (1):** (A) *Sinoxylon muricatum*, (B) *S. anale*, (C) *S. ceratoniae*.



**Plate (2):** Variations of color in *S. muricatum*.  
(A, B, C from least to more frequent, sequentially)

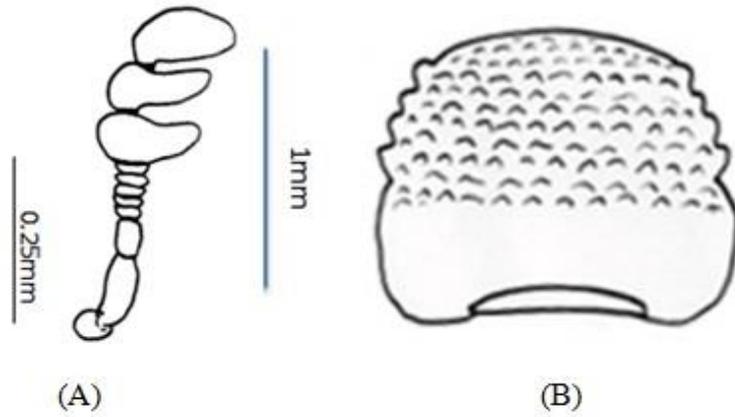


Figure (1): *S. muricatum*; (A) Antenna, (B) Pronotum.

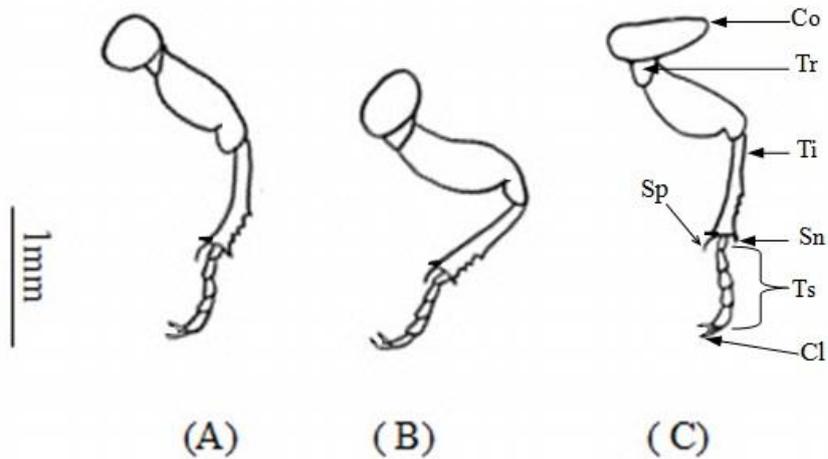


Figure (2): Legs of *S. muricatum*; (A) Fore leg, (B) Mid leg, (C) Hind leg. (Co: coxa, Sn: spine, Sp: spur, Tr: trochanter, Ti: tibia, Ts: tarsus, Cl: claw)

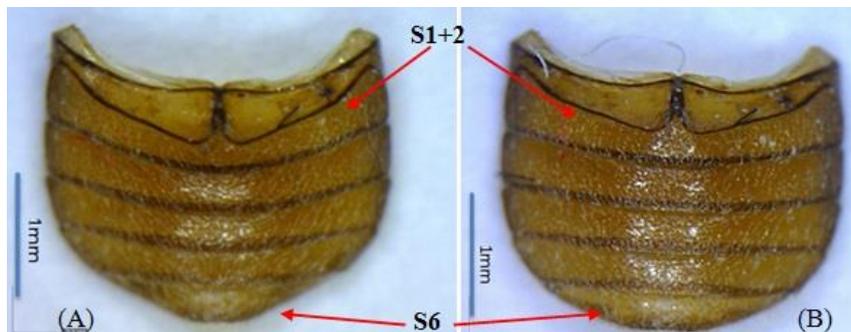
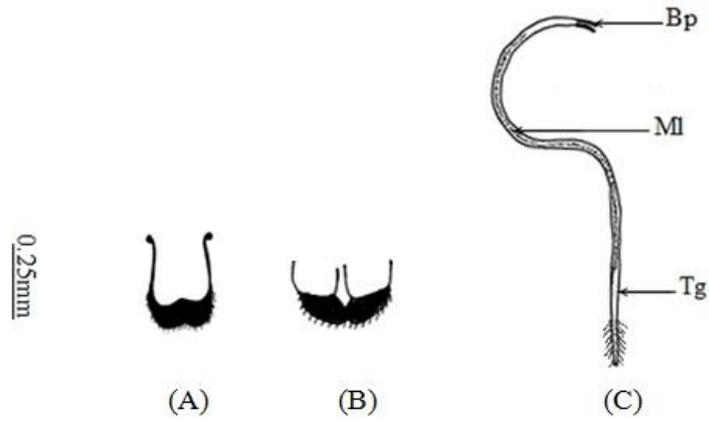
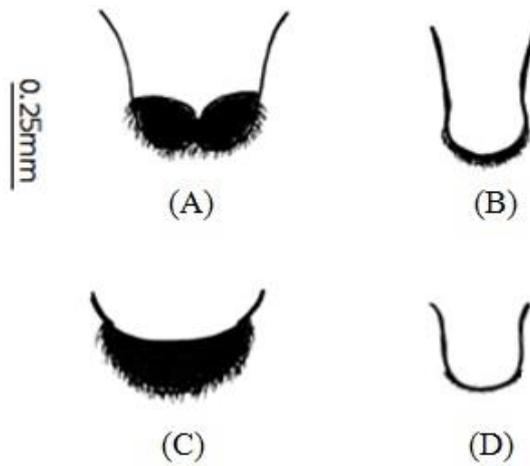


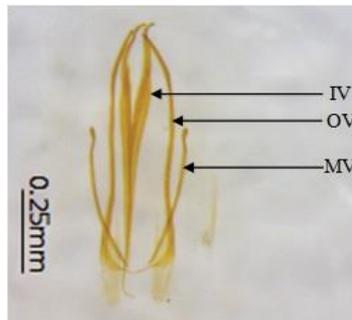
Plate (3): Ventral view of abdomen in *S. muricatum*; (A) Male, (B) Female. (S: Sternite)



**Figure (3):** Male of *S. muricatum* (A) Eight tergite; (B) Seven Sternite; (C) Male genitalia. Bp: Basal piece Ml: median lobe Tg: tegmen

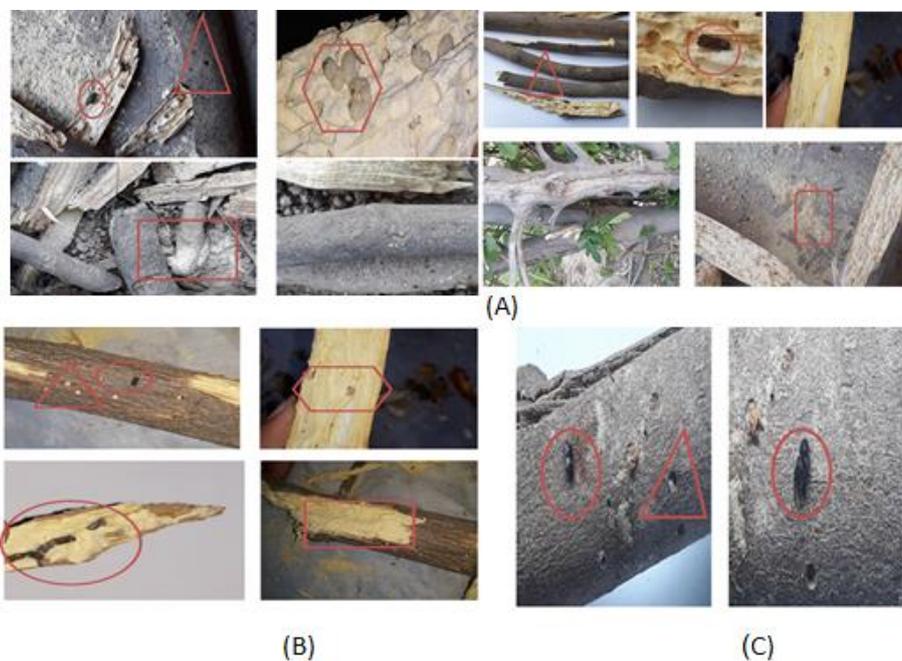


**Figure (4):** Some parts of abdomen in female of *S. muricatum*; (A, B) 8<sup>th</sup> and 9<sup>th</sup> tergites, (C, D) 7<sup>th</sup> and 8<sup>th</sup> sternites.



**Plate (4):** Female genitalia of *S. muricatum*  
(IV: Inner valve; MV: Median valve; OV: Outer valve)

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**Plate (5):** Damage of insects on trees; (A) *S. muricatum* on fig trees, (B) *S. anale*; on jujube trees, (C) *S. ceratoniae* on mulberry trees.

LITERATURE CITED

- Akhter, K. 2005. Preservative treatment of rubber wood (*Hevea brasiliensis*) to increase its service life. The International Research Group on Wood Protection, 36<sup>th</sup> annual meeting, Bangalore (India), 24-28 pp.
- Al- Ali, A. S. 1977. Phytophagous and Entomophagous Insects and Mites of Iraq. *Natural History Research Center Iraq, Publication*, 33: 1-142.
- Arnett, R. H. JR, Thomas, M. C., Skelley, P. E. and Frank, J. H. 2002. American Beetles, Volume II: Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press, Boca Raton, 880 pp.
- Borror, D. J., Triplehorn, A. C. and Johnson, N. F. 1989. An introduction to the study of insects, 6th ed. Saunders, Philadelphia, 875pp.
- Borowski, J. and Wegrzynowicz, P. 2007. World catalogue of Bostrichidae (Coleoptera ). Wydawnictwo Mantis. Olsztyn, Poland, 247pp.
- Filho, O. P., Teixeira, E. P., Bezerra, M. L. M., Dorval, A. and Filho, E. B. 2006. First record of *Sinoxylon conigerum* Gerstäcker (Coleoptera: Bostrichidae) in Brazil. *Neotropical Entomology*, 35: 712-713.

- Fisher, W. S. 1950. A revision of the North American species of beetles belonging to the family Bostrichidae. United States Department of Agriculture, Miscellaneous Publication, no. 698, 157 pp.
- GBIF Secretariat, 2019. GBIF Backbone Taxonomy. Checklist dataset. Available at: <https://doi.org/10.15468/39omei> accessed via GBIF.org on 2020-06-19.
- Haack, R. A. 2006. Exotic bark- and wood-boring Coleoptera in the United States: recent establishments and interceptions. *Canadian Journal of Forest Research*, 36: 269-288.
- Ivie, A. 2002. Bostrichidae Latreille 1802. In: Arnett, R. H. Jr, Thomas, M. C., Skelley P. E. and Frank, J. H. (eds) American beetles, volume 2. CRC Press, Boca Raton, p 233-244.
- Knopf, H. E. 1971. Contributions to the knowledge of the insect fauna of Trees in Iraq. Part I. Coleoptera. *Zeitschrift für Angewandte Entomologie*, 69 (1-4): 82-87.
- Lesne, P. 1906. Revision des Coléoptères de la famille des Bostrychides, 5 mémoire: Sinoxyloniae. *Annales de la Société entomologique de France*, 75: 445-561. (Abstract in English).
- Löbl, I. and Smetana, A. 2007. Catalogue of Palearctic Coleoptera, Volume 4: Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea and Cucujoidea. 1<sup>st</sup> Edition, Apollo Books, 935pp.
- Liu, L. Y., Schönitzer, K. and Yang, J. T. 2008. A review of the literature on the life history of Bostrichidae (Coleoptera). *Mitteilungen der Münchner Entomologischen Gesellschaft*, 98: 91-977.
- Nair, K. S. S. 2007. Tropical forest insect pests: ecology, Impact, and Management. Cambridge University Press, New York, 404 pp.
- Peters, B. C., Creffield, J. W. and Eldridge, R. H. 2002. Lyctine (Coleoptera: Bostrichidae) pests of timber in Australia: a literature review and susceptibility testing protocol. *Australian Forestry*, 65: 107-119.

**مراجعة للجنس *Sinoxylon* Duftschmid، 1825  
(Coleoptera, Bostrichidae)  
مع تسجيل نوع جديد في وسط العراق**

اخلاص عبد الجبار بديوي\*، راضي فاضل الجصاني\*  
و رزاق شعلان عكل\*\*

\*قسم وقاية النبات، كلية علوم الهندسة الزراعية، جامعة بغداد، بغداد، العراق  
\*\*مركز بحوث و متحف التاريخ الطبيعي، جامعة بغداد، بغداد، العراق

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**الخلاصة**

جرى في هذه الدراسة مراجعة لجنس *Sinoxylon* Duftschmid, 1825 (رتبة غمدية الأجنحة، عائلة ثاقبات الافـرع)؛ و سُجّلت ثلاثة أنواع شملت: *S. ceratoniae* (Linnaeus, 1758)، *S. anale* Lesne, 1897 و *S. muricatum* (Olivier, 1790)؛ إذ وصف النوع الأخير كتسجيل جديد لأول مرة للمجموعة الحشرية العراقية.

صُمم مفتاح للأنواع مدعوماً بالصور التوضيحية للصفات التشخيصية الرئيسية و بعض الاجزاء المظهرية.