



<http://dx.doi.org/10.11646/zootaxa.3826.3.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:F492333C-2C51-4A5E-B78E-3B34C7DBA8F7>

## Alien seed beetles (Coleoptera: Chrysomelidae: Bruchinae) in Europe

RAFAEL YUS-RAMOS<sup>1</sup>, DANIEL VENTURA<sup>2</sup>, KEITH BENSUSAN<sup>3</sup>, PEDRO COELLO-GARCÍA<sup>4</sup>,  
ZOLTÁN GYÖRGY & ANELIA STOJANOVA<sup>6</sup>

<sup>1</sup>*Urb. El Jardín n° 22, 29700 Vélez-Málaga (Málaga), Spain. E-mail: rafayus@telefonica.net*

<sup>2</sup>*Departament d'Indústries Agroalimentàries i Ciències Ambientals (IACA), Escola Politècnica Superior (EPS), Universitat de Vic – Universitat Central de Catalunya (UVic-UCC), C. de la Laura, 13, 08500 Vic (Barcelona), Spain. E-Mail: daniel.ventura@uvic.cat and Functional Ecology and Climate Change Group (ECOFUN), Forest Sciences Center of Catalonia (CTFC), Crta. de Sant Llorenç de Morunys, Km.2, 25280 Solsona (Lleida), Spain. E-Mail: dani.ventura@ctfc.es*

<sup>3</sup>*Gibraltar Botanic Gardens 'The Alameda', Red Sands Road, PO BOX 843, Gibraltar. E-Mail: kbensusan@gibraltargardens.gi*

<sup>4</sup>*Milongas n° 7 (Camposoto), 11100 San Fernando (Cádiz), Spain. E-mail: pedro\_coellogarcia@yahoo.es*

<sup>5</sup>*Magyar Természettudományi Múzeum, H-1088 Budapest u. 13. (Pf.137 for letters), Hungary. E-mail: gyorgy@zoo.zoo.nhmus.hu*

<sup>6</sup>*University of Plovdiv, Department of Zoology, Plovdiv, Bulgaria. E-mail: stanelia@uni-plovdiv.bg*

### Abstract

Under the framework of the DAISIE consortium, whose main mission is to make an inventory of the alien invasive species of Europe and its islands, we review the current state of knowledge and provide an up-to-date catalogue and distributional status for alien seed beetles (Coleoptera: Chrysomelidae: Bruchinae) in Europe. This work is based on studies of the species detected from the last century to the present, but with greater emphasis on the beginning of the 21<sup>st</sup> century, during which new biological studies have been carried out and findings made in European countries. The main objective of this paper is to focus on this last fact, which has promoted new views on the existing and potential threat of exotic bruchids in relation to climate change. This must now be regarded as a matter of concern for European agricultural and environmental policies. Only species of exotic origin introduced in European regions outside their native range were considered. Therefore, species of European origin spreading to new countries within Europe are not treated. Also, we provide a new approach to classifying alien seed beetle species according to their ability to become established, distinguishing between the well-established and those that may appear in seed stores but are not capable of invading natural and agricultural ecosystems. We present a taxonomic characterization of the alien bruchids found in Europe, providing an illustrated key based on external morphological characters of adults. The key facilitates the identification of the sixteen most frequently recorded genera, which represent 37 of the 42 species of exotic species recorded in Europe up to the present, whether established, not established or occasional. Finally, we provide a summary of the state of knowledge of the taxonomy and biology of the 20 most worrying species as pests, both established and non-established. This includes, where appropriate, an illustrated key for the identification of species. The study reveals that the majority of exotic bruchid species in Europe originate in Asia and Africa, from host plant species imported for ornamental or forestry purposes, and that a greater effort in European customs control is advisable.

**Key words:** invasive species, DAISIE, catalogue, identification keys, taxonomy, biology, Chrysomelidae: Bruchinae

### Introduction

The impact of biological invasions by exotic species (non-native) on the conservation of biodiversity and the functioning of native ecosystems is becoming increasingly evident (Wittenberg & Cock 2001, Sax *et al.* 2005, Melbourne *et al.* 2007, Sax *et al.* 2007, Roques *et al.* 2010, Pimentel 2011). In the last 200 years, a significant number of exotic species have become established successfully in large areas of Europe (Hulme 2007), a phenomenon which, according to all forecasts, is set to increase in the coming decades (Sala *et al.* 2000) and could accelerate the degradation of local ecosystems (Vilà *et al.* 2007).

interest. It is also one of the most commonly used laboratory animals, especially for physiological and ecological studies. A summary of the state of knowledge until the mid-twentieth century is in Hoffmann *et al.* (1963) and later in Delobel & Tran (1993). Work continues to the present, e.g. Qi & Burkholder (1982) on endocrine regulation; Giga & Smith (1983), Moreno *et al.* (2000) and Zannou *et al.* (2003) on its life cycle. A comprehensive manual on the biology of this insect was published recently by Beck & Blumer (2011).

## 20. *Callosobruchus phaseoli* (Gyllenhal, 1833)

This is a less well-known and widespread species than other *Callosobruchus*. It is of uncertain origin but is possibly from the Oriental region. Hoffmann *et al.* (1963) attributed an American origin to it that is unlikely, as this genus does not exist in the New World. In any case, this species has also become cosmopolitan due to commercial trade of legume seeds. It is known from a smaller range of host plants than the other species of the genus, but with additional plants such as beans (*Phaseolus vulgaris*) (from where it took its scientific name), the genus *Vigna* (*V. mungo*, *V. radiata*, *V. umbellata* and *V. unguiculata*) and other legumes such as *Cajanus cajan*, *Cicer arietinum*, *Lablab purpureus* and *Pisum sativum*. The species was first detected in Europe in 1945, in France (Beenen & Roques 2010). It has now been detected in the Czech Republic, the UK, Greece, Italy, Poland and Spain (Anton 2010), as well as Albania (Beenen & Roques 2010). As with other *Callosobruchus* species, *C. phaseoli* is not established in Europe, since it has never been found outdoors. It is only able to reproduce in storehouses as it requires temperatures ranging between 30–32.5°C and a humidity level of 70%, environmental conditions more typical of tropical and subtropical countries. Its status in Southern Europe will depend on how climate change progresses. The pre-imaginal stages have not been described yet. Its biology has barely been studied; Utida (1971) provides some of the only data on the environmental conditions required by the species.

## Acknowledgments

We are grateful to Ron Beenen (Nieuwegein, The Netherlands) and Matthias Schöller (Berlin, Germany) for their effort in reviewing the manuscript, providing helpful comments and suggestions.

## References

- Abeille de Perrin, E. (1888) Tableau synoptique des Bruchides et Urodonides Français. *Revue d'Entomologie*, 7, 77–90.
- Anton, K.-W. (2010) Subfamily Bruchinae. In: Löbl, I. & Smetana, A. (Eds.), *Catalogue of Palaearctic Coleoptera. Vol. 6. Chrysomeloidea*. Apollo Books, Stenstrup, pp. 339–353.
- Anton, K.-W. & Delobel, A. (2003) African species of the *Bruchidius centromaculatus* group with “eyed” female pygidium (Coleoptera: Bruchidae: Bruchinae). *Genus*, 14 (2), 159–190.
- Anton, K.-W., Halperin, J. & Calderon, M. (1997) An annotated list of the Bruchidae of Israel and adjacent areas. *Israel Journal of Entomology*, 31, 59–96.
- Armentia, A., Lombardero, M., Blanco, C., Fernández, S., Fernández, A. & Sánchez, R. (2006) Allergic hypersensitivity to the lentil pest *Bruchus lentis*. *Allergy*, 61 (9), 1112–1116.  
<http://dx.doi.org/10.1111/j.1398-9995.2006.01123.x>
- Arora, G.L. (1978) Taxonomy of the Bruchidae (Coleoptera) of Northwest India. Part II. larvae. *Oriental Insects, Supplement*, 8, 1–48.
- Beck, C.W. & Blumer, L.S. (2011) *A Handbook on Bean Beetles, Callosobruchus maculatus*. National Science Foundation, 12 pp.
- Beenen, R. & Roques, A. (2010) Leaf and Seed Beetles (Coleoptera, Chrysomelidae). Chapter 8.3. In: Roques, A., Kenis, M., Lees, D., Lopez-Vaamonde, C., Rabitsch, W., Rasplus, J.-Y. & Roy, D.B. (Eds.), *Alien terrestrial arthropods of Europe. BioRisk*, 4 (1), 267–292.
- Begum, A., Ahmed, M. & Seal, D.R. (1984) Influence of temperature on population increase of pulse beetle, *Callosobruchus analis* Fabricius (Coleoptera: Bruchidae). *Bangladesh Journal of Zoology*, 12, 21–26.
- Bhattacharya, B. & Banerjee, T.C. (2000) Divergent life-history traits of *Callosobruchus chinensis* (L.) (Coleoptera: Bruchidae) infesting stored pulses. *Oriental Insects*, 34 (1), 203–214.  
<http://dx.doi.org/10.1080/00305316.2000.10417258>
- Boe, A. & Johnson, P.J. (2008) Seed predation by *Acanthoscelides submuticus* and *A. pallidipennis* (Coleoptera: Bruchidae) in

- false indigo in the northern great plains. *Proceedings of the South Dakota Academy of Science*, 87, 223–227.
- Bonet, A. (1981) Biología del complejo *Acanthoscelides obtectus* Say (Col.: Bruchidae) en poblaciones silvestres y cultivadas de *Phaseolus*. *Folia Entomológica Mexicana*, (XVI Congreso nacional de entomología, Abril 6–8, 1981), 48, 45–46.
- Borowiec, L. (1980) A new species of *Acanthoscelides* Schilsky from Bulgaria (Coleoptera, Bruchidae). *Polskie Pismo Entomologiczne*, 50, 167–170.
- Borowiec, L. (1983) A survey of seed-beetles of Bulgaria (Coleoptera, Bruchidae). *Polskie Pismo Entomologiczne*, 53, 107–127.
- Borowiec, L. (1984) Two new genera and species of seed-beetles from the oriental region. (Coleoptera, Bruchidae, Bruchinae). *Polskie Pismo Entomologiczne*, 54, 115–129.
- Borowiec, L. (1987) The genera of seed-beetles (Coleoptera, Bruchidae). *Polskie Pismo Entomologiczne*, 57, 3–207.
- Borowiec, L. (1988) *Bruchidae—strakowce* (Insecta: Coleoptera). Fauna Polski, volume 11. Polska Akademia Nauk Instytut Zoologii, Warsaw, 226 pp.
- Borowiec, L. & Anton, K.-W. (1993) Materials to the knowledge of seed beetles of the Mediterranean Subregion (Coleoptera: Bruchidae). *Annals of the Upper Silesian Museum, Entomology*, 4, 99–152.
- Bridwell, J.C. (1932) The subfamilies of the Bruchidae (Coleoptera). *Proceedings of the Entomological Society of Washington*, 34 (6), 100–106.
- Bridwell, J.C. (1946) The genera of beetles of the family Bruchidae in America north of Mexico. *Journal of the Washington Academy of Sciences*, 36 (2), 52–57.
- Burleigh, R. & Southgate, B.J. (1975) Insect Infestation of Stored Egyptian Lentils in Antiquity. *Journal of Archaeological Science*, 2, 391–392.  
[http://dx.doi.org/10.1016/0305-4403\(75\)90010-2](http://dx.doi.org/10.1016/0305-4403(75)90010-2)
- Cancela da Fonseca, J. (1956) *Contribuição para o estudo da ecologia de Pachymerus acaciae* Gyll. (Coleoptera, Bruchidae). Estudos, Ensaios e Documentos XIX. Ministerio de Ultramar. Junta de Investigações do Ultramar, Lisboa, 125 pp.
- CEBE (2009) *Bruchidius siliquastri* Kergoat, P. Delobel & A. Delobel (2007). Available from: <http://cebe.waarnemingen.be/waarneming/view/44682777> (accessed 26 May 2013)
- Chûjô, M. (1937) Some additions and revisions of Bruchidae (Coleoptera) from the Japanese empire. *Transactions of the Natural History Society of Formosa*, 27, 189–201.
- DAISIE (2009) *Handbook of Alien Species in Europe*. Springer, Dordrecht, 400 pp.
- Decelle, J. (1966) La bruche sud-américaine des acacias: *Pseudopachymerina spinipes* (Erichson). *Bulletin & Annales de la Société Royale d'Entomologie de Belgique*, 102 (5), 109–116.
- Decelle, J. (1975) Les Bruchidae (Coleoptera) des Iles Canaries. *Bulletin et Annales de la Société royale belge d'Entomologie*, 111, 109–142.
- Decelle, J. (1979) Un Bruchide nord-américain, *Acanthoscelides seminulum* (Horn), en voie d'indigenation en Europe centrale et meridionale. *Bulletin et Annales de la Société royale belge d'Entomologie*, 115, 28.
- De la Fuente, J.M. (1919) Lista inédita de los Coleópteros de España. *Boletín de la Real Sociedad Española de Historia Natural*, 19, 178–188.
- Delobel, B. & Delobel, A. (2005) Les plantes hôtes des bruches (Coleoptera Bruchidae): données nouvelles et corrections. *Bulletin mensuel de la Société linnéenne de Lyon*, 74 (7–8), 277–291.
- Delobel, P. & Delobel, A. (2008) Une nouvelle Bruche asiatique importée en France: *Megabruchidius tonkineus* (Pic) (Col., Bruchinae). *Bulletin de la Société Entomologique de France*, 113 (2), 227–229.
- Delobel, A. & Johnson, C.D. (1998) First record of a seed-beetle on *Leucaena leucocephala* in West Africa. *Leucnet News*, 5, 25–26.
- Delobel, A., Sembène, M., Fédière, G. & Roguet, D. (2003) Identity of the groundnut and tamarind seed-beetles (Coleoptera: Bruchidae: Pachymerinae), with the restoration of *Caryedon gonagra* (F.). *Annales de la Société Entomologique de France (n.s.)*, 39 (3), 197–206.  
<http://dx.doi.org/10.1080/00379271.2003.10697375>
- Delobel, A. & Tran, M. (1993) *Les Coléoptères des denrées alimentaires entreposées dans les régions chaudes*. Faune tropicale XXXII. Orstom Editions, Paris, 425 pp.
- De los Mozos, M. (1992) Brúquidos (Coleoptera: Bruchidae) asociados al cultivo de la lenteja (*Lens culinaris* Medikus) en Castilla-La Mancha: especies implicadas y valoración de la plaga. *Boletín de Sanidad Vegetal, Plagas*, 18, 347–353.
- De Luca, Y. (1956) Contributions à l'étude morphologique et biologique de *Bruchus lentis* Fröhl. Essais de lutte. *Annales de l'Institut Agricole et des Services de Recherches d'Experimentation Agricole de l'Algérie*, 10 (1), 1–94.
- De Luca, Y. (1961) Caractères de la morphologie imaginale de *Pseudopachymerus lallemandi* Marseul (Coléoptères, Bruchidés). *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord*, 52, 253–264.
- De Luca, Y. (1963) Aspect morphologique de la larve néonate de *Pseudopachymerus lallemandi* Marseul (Coléoptères, Bruchidés). *Entomologische Berichten*, 23 (2), 37–40.
- De Luca, Y. (1965) Remarques morphologiques et chétotaxiques sur *Bruchidius albosparsus* (Col. Bruchidae). *Annales de la Société Entomologique de France (n.s.)*, 1, 479–487.
- Dendy, J. & Credland, P.F. (1991) Development, fecundity and egg dispersion of *Zabrotes subfasciatus*. *Entomologia Experimentalis et Applicata*, 59 (1), 9–17.  
<http://dx.doi.org/10.1111/j.1570-7458.1991.tb01481.x>

- Derbel, S., Noumi, Z., Anton, K.-W. & Chaieb, M. (2007) Life cycle of the coleoptera *Bruchidius raddianae* and the seed predation of the *Acacia tortilis* subsp. *raddiana* in Tunisia. *Comptes Rendus Biologies*, 330 (1), 49–54.  
<http://dx.doi.org/10.1016/j.crv.2006.09.003>
- Di-Iorio, O.R. (2005) An asian species of Bruchinae (Coleoptera: Chrysomelidae) developing in the seeds of *Gleditsia triacanthos* L. (Caesalpiniaceae) in Argentina. *Agrociencia*, 39 (3), 327–337.
- Duff, A.G. (2012) Non-established introductions. In: Duff, A.G. (Ed.), *Checklist of Beetles of the British Isles. 2nd Edition*. Pemberley Books, Iver, pp. 131–135.
- Effowe, T.Q., Amevoin, K., Nuto, Y., Mondedji, D. & Glitho, I.A. (2010) Reproductive capacities and development of a seed bruchid beetle, *Acanthoscelides macrophthalmus*, a potential host for the mass rearing of the parasitoid, *Dinarmus basalis*. *Journal of Insect Science*, 10 (129), 1–14.  
<http://dx.doi.org/10.1673/031.010.12901>
- European Commission (2006) *Halting the loss of biodiversity by 2010—and beyond—Sustaining ecosystem services for human well-being*. Communication from the Commission.
- Genduso, P. (1960) Observations on the Bruchids of lentil (*Lens esculenta* Moench). 1st note. *Bruchus lentis* Fröel.—*Bruchus ervi* Fröel. *Bollettino dell'Istituto di Entomologia Agraria e dell'Osservatorio di Fitopatologia di Palermo*, 3, 139–162.
- Giga, D.P. & Smith, R.H. (1983) Comparative life history studies of four *Callosobruchus* species infesting cowpeas with special reference to *Callosobruchus rhodesianus* (Pic) (Coleoptera: Bruchidae). *Journal of Stored Products Research*, 19 (4), 189–198.  
[http://dx.doi.org/10.1016/0022-474x\(83\)90007-3](http://dx.doi.org/10.1016/0022-474x(83)90007-3)
- Grigokov, S.P. (1960) Contribution to the bionomics of the pea Bruchid *Bruchus pisi* L. *Nauchni Trudove, Vissh Selskostopanski Institut "Georgi Dimitrov", Sofia, Agronomicheski Fakultet, Seriya Obshto Zemedelie*, 8, 357–364.
- György, Z. (2007) To the biology of the honey locust seed beetle, *Megabruchidius tonkineus* (Pic, 1904) (Coleoptera: Chrysomelidae: Bruchinae). *Folia Entomologica Hungarica*, 68, 89–96.
- György, Z. & Germann, C. (2012) First record of the invasive *Megabruchidius tonkineus* (Pic, 1904) for Switzerland (Coleoptera, Chrysomelidae, Bruchinae). *Mitteilungen der Schweizerischen entomologischen Gesellschaft*, 85 (3–4), 243–249.
- Haines, C.P. (1989) Observations on *Callosobruchus analis* (F.) in Indonesia, including a key to storage *Callosobruchus* spp. (Col., Bruchidae). *Journal of Stored Products Research*, 25 (1), 9–16.  
[http://dx.doi.org/10.1016/0022-474x\(89\)90003-9](http://dx.doi.org/10.1016/0022-474x(89)90003-9)
- Heetman, A.J.A. & Beenen, R. (2008) Twee exotische zaadkevers ingevoerd met bonen (Coleoptera, Bruchidae). *Entomologische Berichten*, 68 (5), 187–188.
- Hizal, E. & Parlak, N.N. (2013) *Bruchidius terrenus* and *Bruchidius siliquastris* (Coleoptera: Chrysomelidae: Bruchinae) — First Records for Turkey. *Florida Entomologist*, 96 (1), 66–70.  
<http://dx.doi.org/10.1653/024.096.0109>
- Hoebeke, E.R., Wheeler, A.G., Kingsolver, J.M. & Stephan, D.L. (2009) First North American records of the East Palearctic seed beetle *Bruchidius terrenus* (Coleoptera: Chrysomelidae: Bruchinae), a specialist on Mimosa (*Albizia julibrissin*, Fabaceae). *Florida Entomologist*, 92 (3), 434–440.  
<http://dx.doi.org/10.1653/024.092.0304>
- Hoffmann, A. (1945) *Coléoptères Bruchides et Anthribides. Faune de France*, 44. Fédération Française des Sociétés de Science Naturelles. Office Central de Faunistique, Paul Lechevalier, Paris, 184 pp.
- Hoffmann, A., Labeyrie, V. & Balachowsky, A.S. (1963) Famille des Bruchidae. In: Balachowsky, A.S. (Ed.), *Entomologie appliquée à l'agriculture. Tome I: Coléoptères (1<sup>re</sup> partie)*. Masson et Cie Editeurs, Paris, pp. 434–494.
- Howe, R.W. & Currie, J.E. (1964) Some laboratory observations on the rates of development, mortality and oviposition of several species of Bruchidae breeding in stored pulses. *Bulletin of Entomological Research*, 55 (3), 437–477.  
<http://dx.doi.org/10.1017/s0007485300049580>
- Hughes, C.E. & Johnson, C.D. (1996) New host records and notes on Bruchidae (Coleoptera) from *Leucaena* Benth. (Leguminosae, Mimosoideae) from Mexico, Central and South America. *Journal of Applied Entomology*, 120 (1–5), 137–141.  
<http://dx.doi.org/10.1111/j.1439-0418.1996.tb01580.x>
- Hulme, P.E. (2007) Biological invasions in Europe: drivers, pressures, states, impacts and responses. In: Hester, R.E. & Harrison, R.M. (Eds.), *Biodiversity under threat*. RSC Publishing, Cambridge, pp. 56–80.
- Jashemski, W.F. (1974) The Discovery of a Market-Garden Orchard at Pompeii: The Garden of the "House of the Ship Europa". *American Journal of Archaeology*, 78 (4), 391–404.  
<http://dx.doi.org/10.2307/502753>
- Jermy, T. & Szentesi, Á. (2002) A tonkini óriás-zsizsik [*Megabruchidius tonkineus* (Pic, 1904)] felbukkanása hazánkban. *Növényvédelem*, 38 (7), 346–348.
- Jermy, T., Szentesi, Á. & Anton, K.-W. (2002) *Megabruchidius tonkineus* (Pic, 1904) (Coleoptera: Bruchidae) first found in Hungary. *Folia Entomologica Hungarica*, 63, 49–51.
- Johnson, C.D. & Siemens, D.H. (1996) Oviposition behavior, guilds, distribution and new host records for the genus *Mimosestes* Bridwell (Coleoptera: Bruchidae) from Colombia, Ecuador, Venezuela and Mexico. *The Coleopterists Bulletin*, 50 (2), 155–160.

- Johnson, C.D., Southgate, B.J. & Delobel, A. (2004) A revision of the Caryedontini (Coleoptera: Bruchidae: Pachymerinae) of Africa and the Middle East. *Memoirs of the American Entomological Society*, 44, 1–120.
- Kato, T., Bonet, A., Yoshitake, H., Romero-Nápoles, J., Jinbo, U., Ito, M. & Shimada, M. (2010) Evolution of host utilization patterns in the seed beetle genus *Mimosestes* Bridwell (Coleoptera: Chrysomelidae: Bruchinae). *Molecular Phylogenetics and Evolution*, 55 (3), 816–832.  
<http://dx.doi.org/10.1016/j.ympev.2010.03.002>
- Kergoat, G., Delobel, P. & Delobel, A. (2007) Phylogenetic relationships of a new species of seed-beetle infesting *Cercis siliquastrum* L. in China and in Europe (Coleoptera: Chrysomelidae: Bruchinae: Bruchini). *Annales de la Société entomologique de France (n.s.)*, 43 (3), 265–271.  
<http://dx.doi.org/10.1080/00379271.2007.10697522>
- Kingsolver, J.M. (1979) New Synonymies and new Combinations in North American Bruchidae (Coleoptera). *The Coleopterists Bulletin*, 33 (3), 341–342.
- Kingsolver, J.M. (2004) *Handbook of the Bruchidae of the United States and Canada (Insecta, Coleoptera). Technical Bulletin number 1912. Vol. 1. & 2 (Illustrations)*. United States Department of Agriculture, xi + 324 pp. & ii + 198 pp.
- Kingsolver, J.M. & Johnson, C.D. (1978) *Systematics of the genus Mimosestes (Coleoptera: Bruchidae)*. United States Department of Agriculture, Technical Bulletin number 1590, 106 pp.
- Kocher, L. (1958) Catalogue commenté des Coléoptères du Maroc. Fasc. VIII (Phytophages). *Travaux de l'Institut Scientifique Chérifien, Série Zoologie*, 19, 1–172.
- Kollár, J., Hrubík, P. & Tcakova, S. (2009) Monitoring of harmful insect species in urban conditions in selected model areas of Slovakia. *Plant Protection Science*, 45 (3), 119–124.
- Korotyaev, B.A. (2011) On invasion of an East Asian seed beetle, *Megabruchidius tonkineus* (Pic) (Coleoptera, Bruchidae), developing in *Gleditsia* seeds, in the Northwest Caucasus. *Entomological Review*, 91 (9), 1167–1169.  
<http://dx.doi.org/10.1134/s0013873811090089>
- Larson, A.O., Brindley, T.A. & Hinman, F.G. (1938) *Biology of Pea Weevil in the Pacific Northwest, with suggestions for its control on seed peas. Technical Bulletin number 599*. United States Department of Agriculture, , 48 pp.
- Leroi, B. & Jarry, M. (1981) Relations d'*Acanthoscelides obtectus* avec différentes espèces de *Phaseolus*: Influence sur la fécondité et possibilités de développement larvaire. *Entomologia Experimentalis et Applicata*, 30 (1), 73–82.  
<http://dx.doi.org/10.1111/j.1570-7458.1981.tb03587.x>
- Lucas, M.H. (1858) [Spermophagus semifasciatus]. *Bulletins trimestriels de la Société Entomologique de France in Annales de la Société Entomologique de France, Bulletin entomologique*, 1<sup>er</sup> trimestre 1858, 28.
- Lukyanovich, F.K. & Ter-Minassian, M.E. (1957) *Seed beetles (Bruchidae). Fauna of the USSR, 67: Coleoptera. Vol. 24 (1)*. Zoologicheskii Institut Akademii nauk SSSR, Moscow 209 pp. [in Russian]
- Medjdoub-Bensaad, F., Khelil, M.A. & Huignard, J. (2007) Bioecology of broad bean bruchid *Bruchus rufimanus* Boh. (Coleoptera: Bruchidae) in a region of Kabylia in Algeria. *African Journal of Agricultural Research*, 2 (9), 412–417.
- Melbourne, B.A., Cornell, H.V., Davies, K.F., Dugaw, C.J., Elmendorf, S., Freestone, A., Hall, R., Harrison, S., Hastings, A., Holland, M., Holyoak, M., Lambrinos, J., Moore, K. & Yokomizo, H. (2007) Invasion in a heterogeneous world: resistance, coexistence or hostile takeover? *Ecology Letters*, 10 (1), 77–94.  
<http://dx.doi.org/10.1111/j.1461-0248.2006.00987.x>
- Merkl, O. (2001) Rovarküldöttek (Insect emissaries). *Élővilág*, 10, 12–17.
- Migliaccio, E. & Zampetti, M.F. (1989) *Megabruchidius dorsalis* e *Acanthoscelides pallidipennis*, specie nuove per la fauna italiana (Coleoptera, Bruchidae).. *Bollettino dell'Associazione Romana di Entomologia*, 43 (1–4), 63–69.
- Miller, C., Kettunen, M. & Shine, C. (2006) *Scope options for EU action on invasive alien species (IAS)*. Final report for the European Commission. Institute for European Environmental Policy (IEEP), Brussels, 109 pp.
- Moreno, R.A.P., Duque, G.A., de la Cruz, J. & Tróchez, P.A. (2000) Life cycle and hostes of *Callosobruchus maculatus* (Coleoptera: Bruchidae). *Revista Colombiana de Entomología*, 26 (3/4), 131–135.
- Morimoto, K. (1990) A synopsis of the bruchid fauna of Japan. In: Fujii, K., Gatehouse, A.M.R., Johnson, C.D., Mitchel, R. & Yoshida, T. (Eds.), *Bruchids and Legumes: Economics, Ecology and Coevolution. Series Entomologica. Vol. 46. Proceedings of the Second International Symposium on Bruchids and Legumes (IISBL-2) held at Okayama (Japan), September 6–9, 1989*. Kluwer Academic Publishers, Dordrecht, 131–140 pp.
- Normand, H. (1937) Contribution au Catalogue des Coléoptères de la Tunisie (11<sup>e</sup> fascicule). *Bulletin de la Société d'Histoire Naturelle de l'Afrique du Nord*, 28 (2), 116–143.
- Olckers, T. (2011) Biological control of *Leucaena leucocephala* (Lam.) de Wit (Fabaceae) in South Africa: a tale of opportunism, seed feeders and unanswered questions. *African Entomology*, 19 (2), 356–365.  
<http://dx.doi.org/10.4001/003.019.0219>
- Pajni, H.R. (1987) Ecological status of host range and polymorphism in Bruchidae. In: Donahaye, E. & Navarro, S. (Eds.), *Proceedings of the Fourth International Working Conference on Stored Product Protection, Tel Aviv, Israel, 21–26 September 1986*, 506–516 pp.
- Pajni, H.R. & Jit, S. (1976) Some observations on the biology of *Callosobruchus analis* (Fabr.) (Bruchidae: Coleoptera). *Research bulletin of the Panjab University, Science*, 27 (3/4), 141–146.
- Pfaffenberger, G.S. (1977) Comparative descriptions of the final larval instar of *Bruchus brachialis*, *B. rufimanus*, and *B. pisorum* (Coleoptera: Bruchidae). *The Coleopterists Bulletin*, 31 (2), 133–142.

- Pfaffenberger, G.S. (1985b) Description, differentiation, and biology of the four larval instars of *Acanthoscelides obtectus* (Say) (Coleoptera: Bruchidae). *The Coleopterists Bulletin*, 39 (3), 239–256.
- Pfaffenberger, G.S. (1990b) A scanning electron microscopic view of the final larval instar of *Zabrotes subfasciatus* (Coleoptera: Bruchidae: Amblycerinae). *The Coleopterists Bulletin*, 44 (1), 37–49.
- Pfaffenberger, G.S. (1998) Family Bruchidae. In: Stehr, F.W. (Ed.), *An introduction to immature insects of North America*. Vol. 2. Kendal/Hunt Publishing Company, Dubuque, pp. 561–568.
- Pfaffenberger, G.S. & Johnson, C.D. (1976) *Biosystematics of the First-Stage Larvae of Some North American Bruchidae* (Coleoptera). *Technical Bulletin number 1525*, Agricultural Research Service, United States Department of Agriculture, iv + 75 pp.
- Pic, M. (1913) Bruchidae. In: Junk, W. & Schenkling, S. (Eds.), *Coleopterorum Catalogus*. Vol. 26. Pars 55. W. Junk, Berlin, pp. 74.
- Pimentel, D. (Ed.) (2011) *Biological invasions: economic and environmental costs of alien plant, animal, and microbe species*. Second Edition. CRC Press, Boca Raton, Florida, xiv+449 pp.
- Podoler, H. & Applebaum, S.W. (1969) Cuticular darkening in *Callosobruchus chinensis* L. (Coleoptera: Bruchidae) as affected by dietary ascorbic acid. *Journal of Stored Products Research*, 5 (4), 423–425.  
[http://dx.doi.org/10.1016/0022-474x\(69\)90018-6](http://dx.doi.org/10.1016/0022-474x(69)90018-6)
- Ponel, P., Fadda, S., Lemaire, J.-M., Matocq, A., Cornet, M. & Pavon, D. (2011) Arthropodes de la Principauté de Monaco. Coléoptères, Hétéroptères. Aperçu sur les Fourmis, les Isopodes et les Pseudoscorpions. MONACOBIODIV Rapport final—1er février 2011, 100 pp. Available from: <http://www.troglogrites.fr/MonacoBiodivEntomo.pdf> (accessed 26 May 2013)
- Prevett, P.F. (1967) The larva of *Caryedon serratus* (Ol.): The Groundnut Seed Beetle (Coleoptera: Bruchidae). *Journal of Stored Products Research*, 3 (2), 117–123.  
[http://dx.doi.org/10.1016/0022-474x\(67\)90021-5](http://dx.doi.org/10.1016/0022-474x(67)90021-5)
- Prevett, P.F. (1971) The larvae of some Nigerian Bruchidae (Coleoptera). *Transactions of the Royal Entomological Society of London*, 123 (3), 247–312.  
<http://dx.doi.org/10.1111/j.1365-2311.1971.tb00845.x>
- Prévost, M.-A. & Bain, A. (2007) L'implantation d'une colonie terre-neuvienne au XVII<sup>e</sup> siècle: l'apport des analyses archéobotanique et archéozoologique. In: Bain, A., Chabot, J. & Mousesette, M. (Eds.), *La mesure du passé: contributions à la recherche en archéométrie (2000–2006)*. British Archaeological Reports International Series 1700. Archaeopress, Oxford, pp. 205–216.
- Qi, Y.-T. & Burkholder, W.E. (1982) Sex pheromone biology and behavior of the cowpea weevil *Callosobruchus maculatus* (Coleoptera: Bruchidae). *Journal of Chemical Ecology*, 8 (2), 527–534.  
<http://dx.doi.org/10.1007/bf00987800>
- Riley, C.V. (1891) The pea and bean weevils. *Insect Life*, 4, 297–302.
- Rogers, C.E. & Garrison, J.C. (1975) Seed Destruction in Indigobush *Amorpha* by a Seed Beetle. *Journal of Range Management*, 28 (3), 241–242.  
<http://dx.doi.org/10.2307/3897538>
- Roques, A., Kenis, M., Lees, D., Lopez-Vaamonde, C., Rabitsch, W., Rasplus, J.-Y. & Roy, D.B. (Eds.) (2010) *Alien Terrestrial Arthropods of Europe, Part 1, 2. Biorisk*. Vol. 4. Pensoft Publishers, Sofia, 1028 pp.
- Ryoo, M.I. & Chun, Y.S. (1993) Oviposition behavior of *Callosobruchus chinensis* (Coleoptera: Bruchidae) and weevil population growth: effects of larval parasitism and competition. *Environmental Entomology*, 22 (5), 1009–1015.
- Saiz, F. (1993) Importance of the persistence in the tree of fruits of *Acacia caven* in the infestation by *Pseudopachymerina spinipes* (Coleoptera: Bruchidae). *Revista Chilena de Entomología*, 20, 31–34.
- Saiz, F., Daza, M. & Casanova, D. (1987) Relaciones fenológicas entre *Pseudopachymerina spinipes* (Bruchidae) y *Acacia caven* (Leguminosae). *Anales del Museo de Historia Natural de Valparaíso*. Chile, 18, 55–64.
- Sala, O.E., Chapin III, F.S., Armesto, J.J., Berlow, E., Bloomfield, J., Dirzo, R., Huber-Sanwald, E., Huenneke, L.F., Jackson, R.B., Kinzig, A., Leemans, R., Lodge, D.M., Mooney, H.A., Oesterheld, M., Poff, N.L., Sykes, M.T., Walker, B.H., Walker, M. & Wall, D.H. (2000) Global biodiversity scenarios for the year 2100. *Science*, 287 (5459), 1770–1774.
- Samuelson, G.A. (1991) Bruchid in koa haole pods—*Acanthoscelides macrophthlamus*. *Hawaiian Entomological Society Newsletter*, 1, 2.
- Sax, D.F., Stachowicz, J.J., Brown, J.H., Bruno, J.F., Dawson, M.N., Gaines, S.D., Grosberg, R.K., Hastings, A., Holt, R.D., Mayfield, M.M., O'Connor, M.I. & Rice, W.R. (2007) Ecological and evolutionary insights from species invasions. *Trends in Ecology and Evolution*, 22 (9), 465–471.  
<http://dx.doi.org/10.1016/j.tree.2007.06.009>
- Sax, D.F., Stachowicz, J.J. & Gaines, S.D. (Eds.) (2005) *Species Invasions: Insights into Ecology, Evolution, and Biogeography*. Sinauer Associates, Sunderland, Massachusetts, xiii+495 pp.
- Šefrová, H. (2010) Faunistic records from the Czech Republic (302). Coleoptera: Chrysomelidae: Bruchinae. *Klapalekiana*, 46, 229–230.
- Sharratt, M.E.J. & Olckers, T. (2012) The biological control agent *Acanthoscelides macrophthlamus* (Chrysomelidae: Bruchinae) inflicts moderate levels of seed damage on its target, the invasive tree *Leucaena leucocephala* (Fabaceae), in the KwaZulu-Natal coastal region of South Africa. *African Entomology*, 20 (1), 44–51.

<http://dx.doi.org/10.4001/003.020.0106>

- Shinoda, K. & Yoshida, T. (1990) Life History of the Azuki Bean Weevil, *Callosobruchus chinensis* L., (Coleoptera: Bruchidae), in the Field. In: Fujii, K., Gatehouse, A.M.R., Johnson, C.D., Mitchel, R. & Yoshida, T. (Eds.), *Bruchids and Legumes: Economics, Ecology and Coevolution. Series Entomologica. Vol. 46. Proceedings of the Second International Symposium on Bruchids and Legumes (IISBL-2) held at Okayama (Japan), September 6–9, 1989*. Kluwer Academic Publishers, Dordrecht, 149–159 pp.
- Shomar, N.F. (1963) A monographic revision of the Bruchidae of Egypt (U.A.R.) (Coleoptera). *Bulletin de la Société entomologique d'Égypte*, 47, 141–196.
- Sperandio, L.A.A. & Zucoloto, F.S. (2009) Oviposition behavior of wild *Zabrotes subfasciatus* (Coleoptera, Chrysomelidae) females deprived of the host *Phaseolus vulgaris* (Fabaceae). *Iheringia. Série Zoologia*, 99 (4), 403–408.  
<http://dx.doi.org/10.1590/s0073-47212009000400010>
- Steffan, J.R. (1945) Contribution a l'étude de *Zabrotes subfasciatus* Boheman. *Mémoires du Muséum national d'Histoire naturelle Paris (n.s.)*, 21 (2), 55–84.
- Stojanova, A. (2007) *Megabruchidius tonkineus* (Pic, 1904) (Chrysomelidae: Bruchinae), a new seed beetle to the Bulgarian fauna. *Acta Zoologica Bulgarica*, 59 (1), 109–110.
- Stojanova, A. (2010) Seed beetle *Bruchidius terrenus* (Sharp) (Coleoptera: Chrysomelidae: Bruchinae) – New invasive species to the bulgarian fauna. *Biotechnology & Biotechnological Equipment*, 24 (2), 646–647.
- Stojanova, A.M., György, Z. & László, Z. (2011) A new seed beetle species to the Bulgarian Fauna: *Bruchidius siliquastri*, Delobel (Coleoptera: Chrysomelidae: Bruchinae). *Ecologia Balkanica*, 3 (1), 117–119.
- Szentesi, Á. (1999) Predispersal seed predation of the introduced false indigo, *Amorpha fruticosa* L. in Hungary. *Acta Zoologica Academiae Scientiarum Hungaricae*, 45 (2), 125–141.
- Tan, J.J., Yu, P.Y., Li, H.X., Wang, S.Y. & Jiang, S.Q. (1980) *Economic Insect Fauna of China. Fascicle 18. Coleoptera: Chrysomeloidea (1)*. Science Press, Beijing, xiii–213 pp. [in Chinese]
- Tao, M., Nakagawa, T. & Umemoto, H. (1999) Discovery of a bruchid beetle species from *Amorpha fruticosa* seeds from China. *Kyushu Shokubutsu Boeki*, 564, 4. [in Japanese]
- Terán, A.L. (1962) Observaciones sobre Bruchidae (Coleoptera) del Noroeste Argentino. *Acta Zoologica Lilloana*, 18, 211–242.
- Terán, A.L. (1990) Observaciones sobre Bruchidae del Noroeste Argentino VII. *Pseudopachymerina spinipes* (Erich.) y *P. grata* n. sp. (Coleoptera). *The Coleopterists Bulletin*, 44 (1), 25–28.
- Tuda, M., Shima, K., Johnson, C.D. & Morimoto, K. (2001) Establishment of *Acanthoscelides pallidipennis* (Coleoptera: Bruchidae) feeding in seeds of the introduced legume *Amorpha fruticosa*, with a new record of its *Eupelmus* parasitoid in Japan. *Applied Entomology and Zoology*, 36 (3), 269–276.  
<http://dx.doi.org/10.1303/aez.2001.269>
- Tuda, M., Wu, L.-H., Tateishi, Y., Niyomdham, C., Buranapanichpan, S., Morimoto, K., Wu, W.-J., Wang, C.-P., Chen, Z.-Q., Zhu, H.-Y., Zhang, Y.-C., Murugan, K., Chou, L.-Y. & Johnson, C.D. (2009) A novel host shift and invaded range of a seed predator, *Acanthoscelides macrophthalmus* (Coleoptera: Chrysomelidae: Bruchinae), of an invasive weed, *Leucaena leucocephala*. *Entomological Science*, 12 (1), 1–8.  
<http://dx.doi.org/10.1111/j.1479-8298.2009.00297.x>
- Udayagiri, S. & Wadhi, S.R. (1989) *Catalog of Bruchidae*. Memoirs of the American Entomological Institute, no. 45. American Entomological Institute, Gainesville, 301 pp.
- Utida, S. (1971) Influence of temperature on the number of eggs, mortality and development of several species of Bruchid infesting stored beans. *Japanese Journal of Applied Entomology and Zoology*, 15 (1), 23–30.  
<http://dx.doi.org/10.1303/jjaez.15.23>
- Vats, L.K. (1974) Distinctive characters of the larvae of two species of *Bruchidius* Schilsky (Bruchidae: Coleoptera). *Indian Journal of Entomology*, 36 (2), 113–117.
- Vassiliou, V.A. & Papadoulis, G. (2008) First record of *Acanthoscelides macrophthalmus* (Schaeffer) (Coleoptera: Bruchidae) in Cyprus. *Entomologia Hellenica*, 17 (2007–2008), 52–55.
- Vilá, M., Corbin, J.D., Dukes, J.S., Pino, J. & Smith, S.D. (2007) Linking plant invasions to environmental change. In: Canadell, J.G., Pataki, D.E. & Pitelka, L.F. (Eds.), *Terrestrial ecosystems in a changing world*. Springer, Berlin, pp. 93–102.
- Wendt, H. (1980) Erstmaliges Auftreten des Vorratsschädling *Bruchidius tonkineus* (Pic, 1904) in der DDR. *Deutsche Entomologische Zeitschrift N.F.*, 27 (4–5), 317–318.  
<http://dx.doi.org/10.1002/mmnd.19800270410>
- Wendt, H. (1981) Eine für Südost-Europa neue Samenkäfer-Art (Coleoptera: Bruchidae). *Folia Entomologica Hungarica*, 42, 223–226.
- Williamson, M. (2002) Alien plants in the British Isles. In: Pimentel, D. (Ed.), *Biological invasions: economic and environmental costs of alien plant, animal and microbe species*. CRC Press, Boca Raton, pp. 91–112.
- Wittenberg, R. & Cock, M.J.W. (Eds.) (2001) *Invasive alien species: a toolkit of best prevention and management practices*. CAB International, Wallingford, xii–228 pp.
- Wu, L.H. (2008) *Bionomics of the Leucaena seed beetle (Acanthoscelides macrophthalmus (Schaeffer, 1907)) (Coleoptera: Bruchidae)*. Doctoral Thesis. Department of Entomology, National Taiwan University, Taipei, 68 pp.

- Wu, H.S., Wu, W.J., Wang, C.P. & Chen, S.W. (2007) A new record of bruchid beetle from Taiwan (*Acanthoscelides macrophthalmus*) (Coleoptera: Bruchidae). *Plant Protection Bulletin (Taipei)*, 49 (1), 75–80.
- Yus Ramos, R. (1977) *Estudio taxonómico-biológico de la Familia Bruchidae (Col.) en la Península Ibérica e Islas Baleares*. Trabajos y Monografías de la Estación Experimental “La Mayora” (CSIC), nº 2, Málaga, 569 pp.
- Yus Ramos, R. (2007a) Genera de Coleópteros de la Península Ibérica e Islas Baleares: familia Bruchidae (Coleoptera, Chrysomeloidea). *Boletín de la Asociación Española de Entomología*, 31 (1–2), 65–114.
- Yus Ramos, R. (2007b) Revisión de los Amblycerinae (Coleoptera: Bruchidae) ibero-baleares: caracterización y catálogo provisional. *Boletín de la Asociación Española de Entomología*, 31 (3–4), 101–150.
- Yus Ramos, R. (2008) Catálogo comentado de los brúquidos de las islas Canarias (Coleoptera: Bruchidae). *Vieraea*, 36, 29–54.
- Yus Ramos, R. (2009) Revisión del género *Megabruchidius* Borowiec, 1984 (Coleoptera: Bruchidae) y nuevas citas para Europa. *Boletín de la Sociedad Entomológica Aragonesa*, 45, 371–382.
- Yus Ramos, R. (2010) Correcciones al Catálogo de Coleópteros Bruchinae Paleárticos de Löbl & Smetana (2010) (Coleoptera: Bruchidae). *Boletín de la Asociación Española de Entomología*, 34 (1–2), 219–234.
- Yus Ramos, R. (2012) Novedades de la fauna ibero-balear de brúquidos (Coleoptera: Bruchidae) a incluir en el Catálogo de Coleópteros Paleárticos de Löbl & Smetana (2010). *Boletín de la Asociación Española de Entomología*, 36 (3–4), 335–350.
- Yus Ramos, R., Bensusan, K. & Pérez, C. (2009a) *Bruchidius siliquastris* Delobel, 2007, una nueva especie para la fauna ibérica de brúquidos (Coleoptera: Bruchidae). *Boletín de la Sociedad Entomológica Aragonesa*, 44, 151–156.
- Yus Ramos, R., Bensusan, K., Pérez, C. & Coello García, P. (2009b) Aproximación a la biología de *Bruchidius siliquastris* Delobel, 2007 (Coleoptera: Bruchidae) en *Cercis siliquastrum* L.. *Boletín de la Sociedad Entomológica Aragonesa*, 44, 435–440.
- Yus Ramos, R., Bensusan, K., Pérez, C. & Coello García, P. (2009c) Descripción de estadios preimaginales de *Bruchidius siliquastris* Delobel, 2007 (Coleoptera: Bruchidae). *Boletín de la Asociación Española de Entomología*, 33 (1–2), 161–170.
- Yus Ramos, R. & Coello García, P. (2007) *Caryedon acaciae* (Gyllenhal, 1833), nueva cita para la Península Ibérica y Europa (Coleoptera: Bruchidae). Descripción de los estadios pre-imaginales y del adulto. *Boletín de la Sociedad Entomológica Aragonesa*, 41, 423–436.
- Yus Ramos, R. & Coello García, P. (2008a) Un nuevo brúquido de origen africano para la fauna ibero-balear y europea: *Bruchidius raddianae* Anton y Delobel, 2003 (Coleoptera: Bruchidae). *Boletín de la Sociedad Entomológica Aragonesa*, 42, 413–424.
- Yus Ramos, R. & Coello García, P. (2008b) Ciclo biológico y comportamiento reproductor de *Bruchidius raddianae* Anton y Delobel, 2003 (Coleoptera: Bruchidae) en la acacia sudafricana (*Acacia karroo* Haynes) en la Península Ibérica. *Boletín de la Sociedad Entomológica Aragonesa*, 43, 297–308.
- Yus Ramos, R. & Coello García, P. (2008c) Descripción del ciclo biológico de *Caryedon acaciae* (Gyllenhal, 1833) en la acacia sudafricana (*Acacia karroo* Haynes) en el sur de la Península Ibérica (Coleoptera: Bruchidae). *Boletín de la Sociedad Entomológica Aragonesa*, 43, 351–360.
- Yus Ramos, R., Coello García, P., Bensusan, K. & Pérez, C. (2010) Descripción de la larva I de *Bruchidius siliquastris* Delobel, 2007 (Coleoptera: Bruchidae). *Boletín de la Asociación Española de Entomología*, 33 (3–4), 367–374.
- Yus Ramos, R., Coello García, P., Ventura Pérez, D., Bensusan, K. & Pérez, C. (2009d) Ciclo biológico de *Bruchidius siliquastris* Delobel, 2007 (Coleoptera: Bruchidae) en *Cercis siliquastrum* L. Primera cita para España peninsular. *Boletín de la Sociedad Entomológica Aragonesa*, 45, 349–356.
- Yus Ramos, R., Fernández-Carrillo, J.L. & Fernández-Carrillo, E. (2007a) Sobre la presencia del gorgojo de las acacias, *Pseudopachymerina spinipes* (Erichson, 1833) en la Península Ibérica (Coleoptera: Bruchidae). *Boletín de la Sociedad Entomológica Aragonesa*, 40, 511–522.
- Yus Ramos, R., Kingsolver, J.M. & Romero-Nápoles, J. (2007b) Sobre el status taxonómico actual de los brúquidos (Coleoptera: Bruchidae) en los Chrysomeloidea. *Dugesiana*, 14 (1), 1–29.
- Yus Ramos, R., Ventura, D., Coello García, P. & Stojanova, A. (2011) *Bruchidius terrenus* (Sharp, 1886) (Coleoptera: Bruchidae): Primera cita para la Península Ibérica y para Italia, caracterización del imago y primeros datos biológicos. *Boletín de la Sociedad Entomológica Aragonesa*, 48, 253–260.
- Zacher, F. (1930) Untersuchungen zur Morphologie und Biologie der Samenkäfer (Bruchidae-Lariidae). Beiträge zur Kenntnis der Vorratsschädlinge. 6. Beitrag. *Arbeiten aus der Biologischen Reichsanstalt für Land- und Forstwirtschaft*, 18 (3), 233–384.  
<http://dx.doi.org/10.1007/bf02338783>
- Zannou, E.T., Glitho, I.A., Huignard, J. & Monge, J.P. (2003) Life history of flight morph females of *Callosobruchus maculatus* F.: evidence of a reproductive diapause. *Journal of Insect Physiology*, 49 (6), 575–582.  
[http://dx.doi.org/10.1016/s0022-1910\(03\)00029-5](http://dx.doi.org/10.1016/s0022-1910(03)00029-5)
- Zhang, S.F. & Liu, Y.P. (1991) Identification of *Acanthoscelides* species of *Amorpha fruticosa*. *Forest Pest and Disease*, 1 (1991), 42–43. [in Chinese]