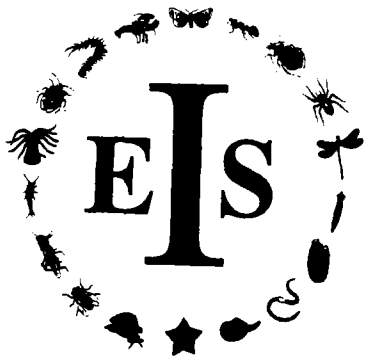
Avec les meilleurs
Compliments,
Luc Willemse



Background information on invertebrates of the Habitats Directive and the Bern Convention

Part II – Mantodea, Odonata, Orthoptera and Arachnida

Edited by:

P. J. van Helsdingen
(Chairman Bern Convention Experts Group in Invertebrate Conservation)

L. Willemse
(European Invertebrate Survey, Leiden, Netherlands)

M. C. D. Speight
(President European Invertebrate Survey)

Nature and environment, No. 80

Council of Europe Publishing

Saga pedo (Pallas, 1771)

Nomenclature
Saga pedo (Pallas, 1771)
Phylum: Arthropoda
Class: Insecta
Order: Orthoptera
Family: Tettigoniidae; Subfamily: Saginae
Synonyms
Saga giganteus (de Villers, 1789)
Saga serrata (Fabricius, 1793)
Saga nudipes (Fischer de Waldheim, 1830)
Saga vittata (Fischer de Waldheim, 1830)
Saga italica Costa, 1836-1857
Infra-specific taxa
none recognised
Vernacular names (Luquet, 1993)
La Magicienne dentelée, Langouste de Provence (French)
(Steppen-)Sägeschrecke, Große Sägeschrecke, Dornenschrecke (German)
Sága stepná (Slovak)
Kobylka Sága (Czech)
Fürészlábú szöke (Hungarian)

Identification
Being wingless, only known in the female sex, very large (body size: 53-75 mm), and by far the largest bush cricket in its distribution area, *Saga pedo* is a very distinctive insect which can only be confused with other *Saga*-species. An identification key and description or diagnosis are given in Kaltenbach (1967, 1986) and Harz (1969). Photographs of adult specimens are given by Kaltenbach, 1967: fig. 7, 8), Kasy (1979), Chinery (1988), Quidet (1988), Bellmann (1993: 158-159), Bellmann & Luquet (1995: 158-159).

Biology
Our knowledge of *Saga* and related genera (the subfamily Saginae) has been summarised by Kaltenbach (1964, 1967, 1970, 1986, 1990). These papers include a large amount of information on the systematics, biology, ecology, distribution and behaviour of representatives of the Saginae. Most information presented here has been drawn from these publications, supplemented with data from recent publications and information received from Orthopterists all over Europe, as mentioned below.
Habitat
Like other *Saga* species *S. pedo* is thermophilic, temperature being the limiting factor influencing the horizontal and vertical distribution. The species may be found in areas from sea level to altitudes of some 1500 m, occasionally higher (Nadig, 1987). According to Kaltenbach (1990) " *Saga* species inhabit both dry and wet meadows, pastures, shrubby hillsides and gorges as well as fallow grain fields and vineyards in southern Europe and western Asia. In Central Europe *Saga pedo* shows a remarkable disjunct distribution, being confined to xerothermic hills which frequently are formed with limestone subsoil." The species is found in dense herbaceous vegetation usually well hidden among long green grass stems. Major components of the vegetation in *Saga* habitats in Central Europe are: *Festuca* spp., *Sesleria* spp., *Poa* spp., *Centaurea* spp., *Eryngium campestre, Juniperus communis, Crataegus monogyna* and *Quercus pubescens*. In France *S. pedo*: does not have a strict habitat preference being found in grassy plains with some bushes, thickets of blackberry bushes and clematis, undergrowth, vineyards, hedges, rugged terrains with kermes oak (Morin 1985, pers. comm.) as well as in hot and arid rugged terrain (Luquet, 1991). Also from Spain the species has been reported from various habitats: dry sites with rugged vegetation, hills, forest edges where it lives hidden away in tall herbs and thickets of *Juniperus* and *Cytisus scoparius reverchonii*, dry pasture land with isolated

patches of bushes, stubble-fields and cornfields (Pinedo, 1985; Herrera Mesa, 1995 pers. comm.; Pardo *et al.*, 1993; Gomez *et al.*, 1991). In Hungary *Saga pedo* is found primarily on rock-steppes and slope-steppes.

Like other species of the Saginae *Saga pedo* is probably mainly active during the twilight and night (Morin, pers. comm.). After the hottest part of the season sagines extend their activities more into daytime periods, the activity however declining as the season progresses (Kaltenbach, 1990). During daytime they live hidden away in the vegetation, remaining motionless and owing to their colour pattern they merge into the background (somatolysis) (Kaltenbach, 1986). This insect does not move when disturbed and is easy to catch (Morin, 1985).

Life cycle

Saga pedo is obligatorily parthenogenetic, being tetraploid (2N = 68) having twice the number of chromosomes found in the other *Saga* species (Matthey, 1941, 1946, 1948a-b). It is likely that there is a relation between its parthenogenetic and its wide distribution area (Matthey, 1941; 1946). Kaltenbach (1967) discusses the question of the existence of males of *Saga pedo*. Although up to 1967, the existence of male *Saga pedo* had been reported in some 50 papers, a careful examination of these references showed that none of these reports was unambiguous, all being based on wrongly identified material. The male of *Saga pedo* is not known.

Three to four weeks after becoming an adult the female begins egg-laying which continues during the entire adult life. Prior to oviposition the female tests the soil by palpating with the antennae and probing with the tip of the ovipositor. The female deposits 25 to 80 eggs in the soil at favourable sites (Burr *et al.*, 1923; Quidet, 1988; 1991). In France oviposition takes place during august-september (Quidet, 1988; 1991). Temperature has a profound effect on embryonic and postembryonic development. At temperatures above 25°C eggs start developing without diapause. At 30°C development of the eggs takes 40-43 days, at 20°C 85 days whereas below these temperatures diapause sets in (Kaltenbach, 1990). In the field eggs usually hatch after 2-3 years of diapause, but may remain in the soil up to five years (B. Nagy, pers. comm.). Contrary to Berenguier (1905) who mentioned 8-9 instars, postembryonic development consists of 6-7 instars (Schall, pers. comm.). Hatching is not known to occur before May, with the first adults appearing in July. Adult life span may be four to six months.

Rearing experiments with *S. pedo* are at the time of writing being carried out in France and Hungary (A. Schall & B. Nagy respectively, pers. comm.).

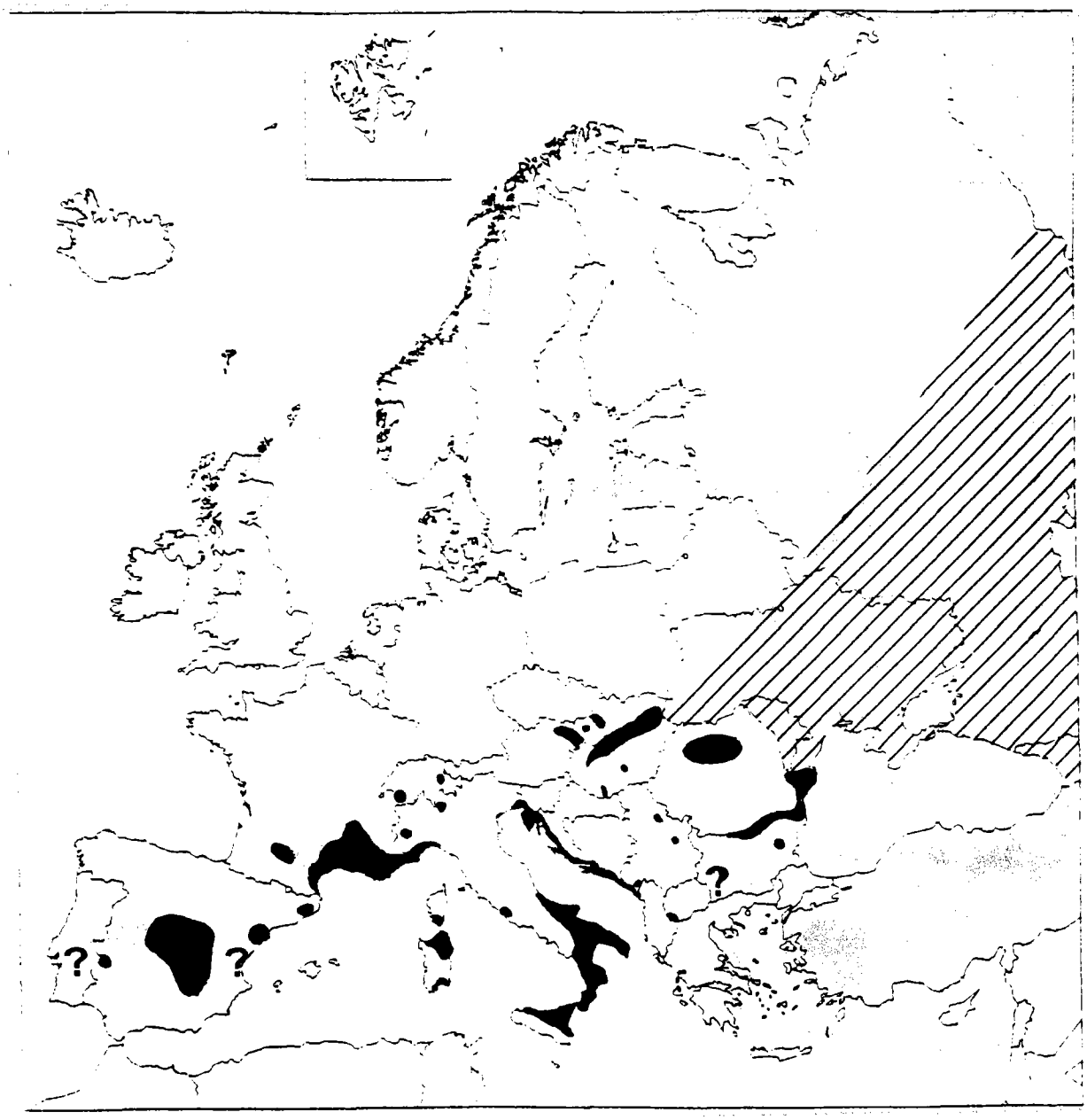
Food

Saga species are obligatorily carnivorous with a well known tendency towards cannibalism (Kaltenbach, 1986; Morin, pers. comm.). Unlike preying mantids who suddenly seize their prey with their front legs *Saga* species move about, catching their prey by suddenly leaping upon it and clasping it with their fore and mid legs. A prey is killed in a similar way each time by biting into its throat (Burr *et al.*, 1923; Kaltenbach, 1970), eating being done at the point of capture. There is a clear preference for other Orthoptera e.g. *Poecilimon* spp. (Boldyrev, 1915; Greathead, 1963), *Oedipoda* spp. (Quidet, 1988), *Chorthippus binotatus* (Gomez *et al.*, 1991). Adults on their turn are preyed upon by birds, insectivores and rodents, lizards, frogs and toads. Nymphs are eaten by spiders, scorpions, centipedes and preying insects. Endoparasitic nymphs of the flesh-fly *Sarcophaga carnaria* occasionally infest *S. pedo*. Egg parasites are unknown.

Range

Saga pedo has a vast distribution area ranging from the Iberian peninsula in the west through Central and South Europe via the southern part of the Russian Federation and the Ukraine to the Caucasus, the Trans-Caspian republics of Turkmenistan and Kazakhstan into north-western China. The northern-most record is located near Sverinogolovskoye, Kurgan district in the Russian federation (54°30'N)(Kaltenbach, 1990), the southern-most in Sicily, Italy. (see also attached map).

Saga pedo was reported as an introduction from Europe into Tompkins Township, Jackson County, Michigan U.S.A. in 1970 by Cantrall (1972). It was hypothesized that eggs had been introduced on plowshares which had been used in Europe in plowing contests. In all only six specimens were found from 1970 to 1972 during August and September. As no specimens have



Saga pedo (Pallas, 1771)

widely distributed
mainly old records

? recorded but exact site not known

been found since it is probable that it is now extinct in North America (Cantrall, pers. comm. in Vickery & Kevan, 1983).

1. European Union

Austria: Confined to the eastern most part of Austria where the species has been found in the provinces of Burgenland and Niederösterreich. Most records are old going back to last century or the first half of this century. There are only very few records from after 1950 (Kaltenbach, 1967; Schall, pers. comm.).

France: Predominantly known from the mediterranean region of France (Copard, 1951; Kruseman, 1988; Voisin, 1992; data de Secrétariat de la Faune et de la Flore). There are quite a number of references, mostly from the past 25 years, concerning the record of one or a few specimens (Aberlenc, 1981; Balazuc & Reveillet, 1968; Bomans, 1990; Bosc, 1977; Breistroffer, 1968; Carriere, 1986; Delabie, 1976; Delarze, 1990; Fonfria, 1992; Hovette, 1971; Luquet, 1991; Morin, 1983, 1985, 1994; Moulet, 1992, Pasquier, 1968; Perrier, 1957; Quidet, 1988, 1991; Voisin, 1979). In the Rhône valley *S. pedo* reaches as far north as the valley of the Drôme, to the west it reaches the département Lot. Nowhere to be encountered in numbers. At some places however, like the southern slopes of the Grand Luberon (Guilbot, pers. comm.) and Mt. Ventoux the species is encountered regularly.

Greece: Old records of this species from Greece are based on misidentification or misinterpretations; although the species has been recorded from adjoining Macedonia and Bulgaria, the species up to now has never been recorded from Greece.

Italy: Recorded especially from the northern and southern parts of the country (La Greca pers. comm.; Kaltenbach, 1967): Liguria, Lombardia, Piemont and Friuli-Venezia Giulia in the North, Latium and Abruzzo in the Central part of Italy and from Puglia, Calabria, Campania and Sicilia (La Greca, 1959; La Greca & Messina, 1987) in the south as well as from Sardinia.

Portugal: Reported from two sites in southern Portugal at the beginning of this century (Aires & Menano, 1916) and never found since. The records turned out to be questionable and for all we know the species does not occur in Portugal (Pinedo, 1985). Even so, having been found in Badajoz the species may well occur there.

Spain: For a long time thought to be confined to Central Spain but probably more widely distributed. Known from the provinces of Albacete (Gomez *et al.*, 1991; Pardo *et al.*, 1993), Badajoz, Ciudad Real, Cuenca, Gerona, Madrid, Segovia, Tarragona, Toledo, Valencia (Pinedo, 1985; 1988). After 1971 only found at several localities in the provinces of Albacete (Gomez *et al.*, 1991; Pardo *et al.*, 1993) and Cuenca (Defaut, pers. comm.).

2. Range outside the European Union

Bulgaria: Reported from various areas (Buresch & Peschev, 1958): south-western Bulgaria (Peshev & Andreeva, 1986), the Black Sea coast (Peshev & Djingova, 1974), south of the Donau and near Sofija (Kaltenbach, 1967).

China: Only very recently reported for the first time from China from Xinjiang, northwestern China (Huang, 1987; Xing-Bao & Kai-Ling, 1994)

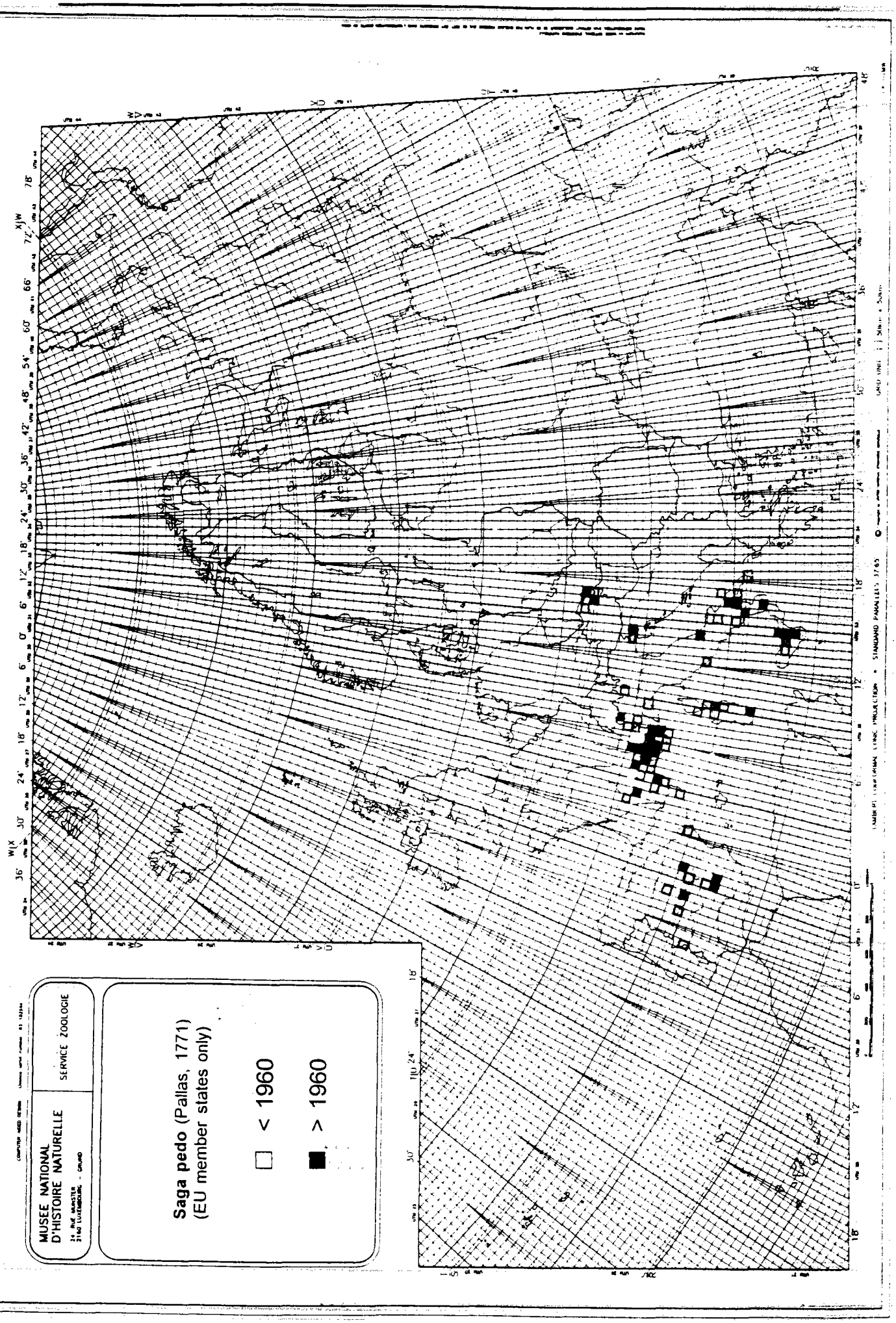
Czech Republic: limited to Moravia where it is known from three localities only: Znojmo, Pouzdrany-Pouzdranske´ kopce and Pavlovské kopce (L. Vidlicka pers. comm.).

Hungary: isolated and sporadic in the Hungarian mountainous areas; known from the Mecsek and Villany mountains in the south, the Bakony mountains in central Hungary and along the northern boundary of Hungary from the Vertes mountains in the west to the Zemplen mountains in the east (Nagy *et al.*, 1983; Racz, 1992; Racz & Varga, 1985; Racz, pers. comm.). It was not known from the Pannonian Plain until 1992 when surprisingly some specimens were detected in the middle of the Carpathian Basin (B. nagy, pers. comm.).

Romania: rare and local, known from various isolated sites across the country: Siebenbürgen, Banat, Moldau, Dobrudscha, with most records from the Dobrudscha (Kis, 1967; 1970; Kis & Vasiliu, 1970; 1972; Knechtel & Popovici-Biznosanu, 1959; Kohler, 1988).

Slovakia: *Saga pedo* is known from 8 localities in the west (Bratislava-Koliba, Devinska Kobyla, Plavecké Podhradie, Zachtice, Hlohovec, Nitra-Zobor, Lúka) and 3 in the south-east of the country (Plesivec, Slovenské Nové Mesto,Vinné) (L. Vidlicka, pers. comm.).

Switzerland: Known from Wallis and Graubunden (Thorens & Nadig, in prep.; Dr. P. Thorens, pers. comm.). The former localities are mainly concentrated in the area between Martigny-Ville


MUSEE NATIONAL D'HISTOIRE NATURELLE
SERVICE ZOOLOGIE
Saga pedo (Pallas, 1771)
(EU member states only)
< 1960
> 1960

and Sion, with some older records downstream of Martigny-Ville. The species is mainly found in the plains with one exception, an old and recent record from Chiboz sur Martigny at 1300 m. In the latter it has only been found near Coire (Calanda) (Nadig & Steinmann, 1972).
former USSR: From the former USSR the species is known from the southern part of the Ukraine and the Russian Federation, the Caucasus and the Trans-Caspian republics of Turkmenistan and Kazakhstan.
former Yugoslavia: There are records from Slovenia, Croatia, Serbia, Herzegovina and FYR of Macedonia (Us & Matvejev, 1967; Kaltenbach, 1967). The latter author also mentioning a doubtful record from Montenegro. Very rare in Slovenia with only few reports of sightings of the species especially near the Italian border (S. Gomboc, pers. comm.). Most records are from the coastal areas of Croatia (Dalmatia, Istria). In Serbia the species was recorded by Adamovic (1970) from a sandy steppe area near Beograd, which probably is the first record from the plain in the Carpathian Basin.

Status
Although population densities may be higher than one would expect looking at material collected, *Saga* species never belong to the common Tettigonidids. Low population densities combined with the fact that the species is mainly active during the night and lives hidden away in bushes where it is difficult to detect, make that it is rarely seen and hardly ever encountered in numbers. There are only few sites known to the data-sheet compiler where the species has been observed over a longer period of time. Sites where more specimens have been observed recently, on either one occasion or during various visits are for instance the Sierra de Alcaraz, Albacete province, Spain (Gomez *et al.*, 1993; Prado *et al.*, 1991) or the Mt. Ventoux and Luberon Mts., Vaucluse, France (Guilbot, pers. comm.). The fact that the species has not been observed in a certain area does not necessarily mean it is absent. Luquet (1991) for instance found *Saga pedo* in an area which he had visited a number of times between 1972 and 1990 without ever encountering it. Despite it being rare and local throughout its distribution area the range of *S. pedo* is by far the largest of all *Saga* species. Looking at all available records, taking into consideration the range of the species, the long collecting period and the differences in intensity of monitoring it is very difficult to make a proper assessment of the status of *Saga pedo*. This problem is reflected by red lists of some European countries in which the status given to *Saga pedo* is "indeterminate". Some Orthopterists who have been approached for information on *S. pedo* expressed the view that this species is fairly common but secretive and far less in danger than currently thought.
1. European Union
Austria: mentioned on the red list in the category "extinction to be expected in the near future" (Kaltenbach, 1984). The most recent records from Austria known to the data-sheet compiler are 1983-1984 when it was found between Vienna and the Neusiedlersee.
France: protected and included in the red book, its status being "not determined" (Anonymous, 1994). Contrary to for instance the situation in Austria where the number of records of this species rapidly dwindled after 1950, records for *S. pedo* from France have been numerous over the last decades. Yet again, like for other countries, records have been too few for a detailed assessment of the situation of *S. pedo* in France.
Italy: In the south, the species is rare possibly due to the use of insecticides (La Greca pers. comm.). On the other hand the species has been found regularly over a prolonged period of time in the region around Triest (Kleukers, La Greca pers. comm., Ramme, 1951)
Spain: Because *S. pedo* is not an endemic species of the Iberian peninsula it was not included in the red book for the Orthoptera of the Iberian peninsula (Rosas *et al.*, 1993; Gangwere *et al.*, 1986). According to Herrera Mesa (pers. comm.) its distribution area in Spain remained fairly stable but he still considers it vulnerable.
2. Status outside the European Union
Bulgaria: there is no recent information available on the status of this species in Bulgaria
former Czechoslovakia: endangered (E - according to Red book of Slovakia)
Hungary: vulnerable (Rakonczay, 1989); the species is protected. There are strong indications of the disappearance of certain populations as a result of the destruction of the habitat at Gellerthegy and Hárshegy in Budapest, at Pilis near Pilisszántó and at Bélapátfalva (Nagy *et al.*,

1983). There is no explanation for the recently detected occurrence in the plains of central Hungary (Bugac) (B. Nagy, pers. comm.).
Romania: there is no recent information available on the status of this species in Romania
Switzerland: threatened with extinction (Nadig & Thorens, 1994). Based on present data it is not possible to present a well documented assessment of the regression and threats to which *Saga pedo* is exposed in Switzerland. What can be hypothesised can be summarised as follows (Dr. P. Thorens, pers. comm.). In the Valais there are still considerable areas with suitable habitat for *Saga pedo* (steppe grasslands and sun exposed bushes) situated in between forest zone and agricultural land (vineyards). Threats posed to its habitat have increased over the last decades, consisting of: enlargement of cultivated areas (vineyards), encroachment of bushes on grasslands, the cutting up of areas with suitable habitats, lack of sufficient prey animals and the use of pesticides in viticulture. In the Grisons even less information is available on the status of *Saga pedo*. The species undoubtedly is very rare and the fact that it has been found close to the river Rhine implies that it is seriously threatened by changes in that area (urbanization) (Dr. P. Thorens, pers. comm.).
former USSR: vulnerable (Lindt, 1984)
former Yugoslavia: in Slovenia *Saga pedo* is protected (S. Gomboc, pers. comm.) being given the status "indeterminate" in the red list of endangered Orthopteroidea in Slovenia (Matvejev, 1992). There is no information available from Croatia, Bosnia-Herzegovina, former Yugoslavia and FYR of Macedonia.

Conservation
Saga pedo is listed in Appendix II of the Bern Convention and Annex IV of the Habitats Directive. The species has a very wide range although being rare and local throughout its range. The species has been found in a wide variety of biotopes.

By its apparent haphazard occurrence, its size and its parthenogenetic, this insect is surrounded by mystery (Morin pers. comm.) and has drawn a lot of attention. Despite all this attention there is still little known about its exact distribution pattern, its population dynamics, and habitat requirements, aspects which need to be studied in detail. Such studies will indicate whether this species has been included correctly in Annex IV of the Habitats Directive and if so what measures can be taken to ensure adequate protection, including the allocation of key sites. Until such time it is of utmost importance to try and protect the sites where populations of *Saga pedo* are known to exist. Sites where *S. pedo* is known to occur are threatened by various factors like quarrying, bushfires, disruption of the vegetation, the use of insecticides.

Recommendations:
Since the species is listed in Appendix IV and therefore should be strictly protected in Europe it is desirable that the following research should be carried out.
- study of population dynamics and ecology; an important aspect to be addressed concerns the question if and to what extent populations are stationary
- study in detail the habitat of *Saga pedo* and work out the measures for its protection (Russian Red Data Book)
- the distribution area should be established more precisely, in particular on a small scale level.

Bibliography
Below papers are mentioned which have been used while preparing this data sheet. More references concerning Saginae in general and *Saga pedo* more in particular are found in Kaltenbach (1967, 1970, 1986, 1990) and Harz & Kaltenbach, 1976.

Aberlenc, H.P., 1981. Capture de l'Orthoptère *Saga pedo* Pallas en Ardèche. - *l'Entomologiste* 37(1): 41.
Aires, B. & H.P. Menano, 1916. *Catálogo sinóptico dos Ortópteros de Portugal.* - Coimbra.
Anonymous, 1994. *Inventaire de la faune menacée en France.* - Nathan, MNHN, Paris. 196 pp.
Balazuc, J. & P. Reveillet, 1968. Nouvelles captures de *Saga pedo* Pall. (=*serrata* F.) dans le bassin du Rhône (Orth. Ensif. Tettigoniidae). - *l'Entomologiste* 24(1): 1-3.
Bellmann, H., 1993. Heuschrecken beobachten, bestimmen. 2 Ed. - Naturbuch Verlag, Augsburg. 349 pp.
Bellman, H. & G.C. Luquet, 1995. *Guide des sauterelles, grillons et criquets d'Europe occidentale.* - Delachaux & Niestle, Paris & Lausanne. 384 pp.

Bérenguier, P., 1905. Notes orthoptérologiques. I. La Magicienne Dentelée "*Saga serrata*". - *Bull. Soc. Et. Sci. nat. Nimes* 33: 145-154.
Bérenguier, P., 1906. Prodrome des Orthopteres du departement du Gard et de l'ile de la Camargue. - *Bull. Soc. Et. Sc. nat. Nimes* 34: 1-13.
Bérenguier, P., 1907. Mues de quelques Locustaires: *Saga serrata* Fabricius. - *Bull. Soc. Et. Sc. Nat. Nimes* 35: 17-20.
Boldyrev, B.T., 1915. Contributionsa' l'étude de la structure des spermatophores et des particularités de la copulation chez Locustodea et Gryllodea. - *Hor. Soc. Ent. Ross.* 41: 127-141.
Bomans, H.E., 1990. Capture de *Saga pedo* Pallas dans la Drome. - *l'Entomologiste* 46 (6): 277.
Bonfils, J.,1960. Notes sur quelques Orthoptères de la Corse. - *Bull. Soc. ent. Fr.* 65: 84-91.
Bosc, F., 1977. Apercu sur la faune des Coléoptères des gorges de l'Aveyron. - *l'Entomologiste* 33: 23-25.
Breistroffer, M., 1968. A propos de *Saga pedo* Pallas. - *l'Entomologiste* 24(2): 56.
Buresch, I. & G. Peschev, 1958. Artbestand und Verbreitung der Geradflugler (Orthopteroidea) in Bulgarien unter Berucksichtigung der schadlichen Arten. II. Tettigonioidea. - *Mitt. Zool. Inst.* 7:3-90.
Burr, M., Campbell, B.P. & B.P. Uvarov, 1923. A contribution to our knowledge of the orthoptera of Macedonia. -*Trans. Entomol. Soc. Lond.* 1923: 110-169.
Cantrall, I.J., 1972. *Saga pedo* (Pallas) (Tettigoniidae: Saginae) an old world katydid, new to Michigan. - *The Great Lakes Entomologist* 5(3): 103-106.
Carriere, J., 1986. Un étrange orthoptère: *Saga pedo* Pallas, 1771 (=*Saga serrata* Fabricius 1793). - *Sciences Nat.* 49: 27-28.
Chinery, M., 1988. *Insectes d'Europe occidentale.* - Arthaus, Paris.
Chladek, F., 1980. *Poecilimon intermedius* (Fieb.) - neu für die Tsechoslowakei. - *Articulata* 1: 152.
Chopard, L., 1951. Faune de France. 56. Orthoptéroides. - P.Lechevalier, Paris. 359 pp.
Collins, N.M. & S.M. Wells, 1987. *Invertébrés ayant besoin d'une protection spéciale en Europe.* - Conseil de l'Europe, Strasbourg. 170 pp.
Defaut, B., 1994. Les synusies orthoptériques en région paléartique occidentale. - Publ. A.N.A., La Bastide-de-Sérou (09, France). 275 pp.
Delabie, J., 1976. Une rencontre peu commune: *Saga pedo* Pallas, 1771. - *Bull. Soc. Etude Sci. nat. Beziers (N.S.)* 4(45): 27-30.
Delarze, R., 1990. Étude zoologique des Follatères (Dorénaz et Fully, Valais): III: Les orthoptères (Orthoptera). - *Bull. Murithienne* 108: 89-98.
Fonfria, R., 1992. Une localité nouvelle pour *Saga pedo* Pallas (Orth. Saginae). - *l'Entomologiste* 48(2): 104.
Gangwere, S.K., Viedma, M.G. de & V. Llorente, 1986. *Report on a red book of Iberian Orthoptera.* - Proc. 4th Triennial Meeting, Pan American Acridol. Soc. 28 July-2 August 1985: 129-148.
Gomez, R., Presa, J.J, & M.D.Garcia, 1991. Orthopteroidea del sur de la Provincia de Albacete (Espana) Ensifera. Mantodea. Phasmoptera. Blattoptera. Dermaptera. - *Anales de Biologia* 17: 7-21.
Greathead,D., 1963. A review of the insect enemies of Acridoidea (Orthoptera). - *Trans. Roy. Entomol. Soc. London* 114(14): 437-517.
Harz, K., 1969. *The Orthoptera of Europe.* - Junk, The Hague. vii+749 pp.
Harz, K. & A. Kaltenbach, 1976. The Orthoptera of Europe. III. - Series entomologica 12: 434 pp.
Hovette, C., 1971. Note sur la reproduction du Faucon crécerellette *Falco naumanni* en Provence. - *Nos Oiseaux* 31: 82-90.
Huang, R.Y.Y., 1987. New record of Chinese Saginae. - *Entomotaxonomia* 8(4): 290.
Jaus, I., 1934. Ein Beitrag zur Biologie und Ökologie von *Saga serrata* Fabr. - *Konowia* 13(3): 171-177
Kaltenbach, A., 1964. Zur Systematik und Verbreitung der Raub heuschrecken (Tettigoniidae Saginae), insbesondere der europaischen Arten der Gattung *Saga* Charpentier. - *Z. Arbeitsgen. österr. Ent., Wien* 16: 68-82
Kaltenbach, A., 1967. Unterlagen für eine Monographie der Sa ginae. I. - *Beitr. Ent.* 17: 3-107.
Kaltenbach, A., 1970. Unterlagen für eine Monographie der Saginae II. Beiträge zur Autökologie der Gattung *Saga* Charpentier (Saltatoria: Tettigoniidae). - *Zool. Beitr.* 16: 155-245
Kaltenbach, A., 1984. *Rote Liste gefährdeter Geradflüglerartiger (Orthopteroidea), Schaben und Fangschrecken (Dictyoptera) Österreichs unter besonderer Berücksichtigung des pannonischen Raumes.* pp. 69-72 in J. Gepp (ed.): Rote Listen gefährdeter Tiere Österreichs.
Kaltenbach, A., 1986. *Saginae. (Saltatoria-Tettigoniidae).* - Das Tierreich 103: VII+92 pp.
Kaltenbach, A.P., 1990. *The predatory Saginae.* pp. 280-302 in Baily, W.J. & D.C.F. Rentz (eds.) The Tettigoniidae. Biology, systematics and evolution. - Springer verlag, Berlin. 395 pp.
Kasy, F., 1979. Ein "Steppen-reservat vor Wien. - *Nationalpark* 24 (3/79): 182-195
Kis, B., 1967. Ord. Orthoptera. in: L'Entomofaune des forêts du sud de la Dobroudja. - *Travaux Mus. Hist. Nat. Gregore Antipa* 7: 107-113.

Kis, B., 1970. Raionarea zoogeografica a Romaniei pe baza faunei de Ortoptere. - *Stdia Univ. Babes-Bolyai, s. Biol.*, 10: 113-125.

Kis, B. & A.M. Vasiliu, 1970. Kritisches Verzeichnis der Orthopteren-Arten Rumäniens. - *Trav. Mus. Hist. Nat. "Grigore Antipa"* 10: 207-227.

Kis, B. & M.A.Vasiliu, 1972. Ord. Blattodea, Mantodea, Orthoptera et Dermaptera. in: L'Entomofaune du Grind de Caraorman, Delta du Danube. - *Trav. Mus. Hist. Nat.* 13: 117-124.

Knechtel, W.K. & A. Popovici-Biznosanu, 1959. Orthoptera. - *Fauna Republ. popul. Romine. Insecta* 7(4): 3-336.

Kohler, G., 1988. Notizen zur Orthopterenfauna des Donau deltas (SO Rumanien). - *Entom. Nachr. Berichte* 32: 175-178.

Kruseman, G., 1988. *Matériaux pour la faunistique des Orthoptères de France. III. Les Ensifères et les Caelifères Tridactyloïdes et Tétrigoïdes des Musées de Paris et d'Amsterdam.* - Verslagen en Technische Gegevens 51: xx+164 pp.

La Greca, M., 1959. Lortotterofauna Pugliese ed il suo significato biogeografico. - *Mem. Biogeogr. Adriat., Padova* 4: 33-170.

La Greca M. & A. Messina, 1987. *La fauna dell'Etna.* pp. 100-140in: Etna, un vulcano una civilta.

Lindt, J., 1984. Liste rouge des Insectes de l'URSS.

Luquet, G.C., 1991. Note sur la répartition et la raréfaction de quelques orthoptéroïdes de la faune francaise (Orthoptera). - *Ent. gall.* 2: 203-208.

Luquet, G.C., 1993. Les noms vernaculaires francais, néerlandais, allemands et anglais des orthoptères d'Europe occidentale (Orth. Ensifera et Caelifera). - *Ent. gall.* 4(2/3): 97-124

Marty, R., 1968. *Recherches écologiques et biochimiques sur les Orthoptères des Pyrénées.* Thèse de Doctorat d'Etat. - Faculté des Sciences de l'Université de Toulouse, 419 pp

Matthey, R., 1941. Etude biologique et cytologique de *Saga pedo* Pallas (Orthoptera - Tettigoniidae) - *Revue suisse de Zoologie* 48(2): 91-142.

Matthey, R., 1945. La répartition de *Saga pedo* Pallas dans le canton du Valais (Orthoptera, Tettigoniidae). - *Bull. Soc. Entomol. Suisse* 19: 482-484.

Matthey, R., 1946. Démonstration du caractère géographique de la parthénogénèse de *Saga pedo* Pallas et de sa polyploidie, par comparison avec les espèces bisexuées *S. ephippigera* et *S. gracilipes.* - *Experientia* 2(7): 1-3.

Matthey, R., 1948a. Données nouvelles sur les chromosomes des Tettigonides et la parthénogénèse de *Saga pedo* Pallas. - *Revue suisse de Zoologie* 55(2):45-56

Matthey, R., 1948b. A propos de la polyploidie de *Saga pedo* Pallas. - *Experientia* 4: 26.

Matvejev, S.D., 1992. *The red list of endangered Orthopteroidea in Slovenia.* - Varstvo Narave 17: 123-129.

Morin, D., 1983. Notes de chasse et observations diverses. *Saga pedo* [Orth. Sagidae] dans la Drôme. - *l'Entomologiste* 39(3): 139.

Morin, D., 1985. Notes de chasse et observations diverses. Captures intéressantes d'Orthopteres dans les Alpes et la vallée du Rhône. - *l'Entomologiste* 41(4): 184.

Morin, D., 1994. Excursion entomologique en Hérault. - *Bull. Soc. ent. Fr.* 99(5): 542.

Moulet, P., 1992. *Saga pedo* (Pallas) (Orthoptera, Tettigoniidae) dans les Bouches du Rhone. - *Nouv. Revue Ent. (N.S.)* 9(3): 238.

Nadig, A., 1987. Saltatoria (Insecta) der Süd- und Südostabdachung der Alpen zwischen der Provence im W, dem pannonischn Raum im NE und Istrien im SEE (mit Verzeichnissen der Fundorte und Tieere meiner Sammlung). - *Rev. suisse Zool.* 94: 257-356.

Nadig, A. & H. Steinmann, 1972. Orthopteren (Geradflügler) und Apoiden (Bienen) am Fusse des Calanda im Churer Rheintal. - *Jahresber. Naturforsch. Ges. Graubündens* 95: 3-88.

Nadig, A. & P. Thorens, 1991. Liste faunistique commentée des Orthoptères de Suisse (Insecta, Orthoptera, Saltatoria). - *Bull. Soc. Entom. Suisse* 64: 281-291.

Nadig, A. & P. Thorens, 1994. *Rote Liste der gefahrdeten Heuschrecken der Schweiz.* pp. 66-68 in Duelli, P. (ed.): Rote Listen der gefährdeten Tierarten der Schweiz. - BUWAL-Reihe Rote Listen, EDMZ Bern. 97 pp.

Nagy, B., 1974. Saltatoria-Arten als Relikte am gefährdeten Bélkö-Berg. - *Folia ent. hung.* 27: 139-144

Nagy, B., Kis, B. & L. Nagy, 1983. *Saga pedo* Pall. (Orthoptera, Tettigoniidae): Verbreitung und ökologische Regelmässigkeiten des Vorkommens in SO-Mitteleuropa. - *Verh. SIEEC X. Budapest* 1983: 190-192.

Nagy, B. & I. Racz, 1995. Orthopteroid insects in the Bükk mountain. in Mahunka (ed.): The fauna of the Bükk National Park. 2. (in press).

Pardo, J.E., Gomez, R. & A del Cerro, 1993. Orthopteroidea de los sistemas montanos de Castilla. La Mancha II. Ensifera. - *Zool. baetica* 4: 113-148.

Pasquier, R., 1968. A propos de *Saga pedo* Pallas. - *l'Entomologiste* 24(2): 56.

Perrier, J. 1957. Capture de *Saga serrata* dans l'Ardèche. - *l'Entomologiste* 13(6): 131.

Peshev, G.P. & E.T.Andreeva, 1986. Orthoptera in southwest Bulgaria. 1. Fauna. - *Bulgarian Acad. Sc. Fauna SW-Bulgaria* 1: 82-117.
Peshev, G. & M. Djingova, 1974. Orthoptera along the Bulgarian Black Sea coast. - *Bull. inst. Zool. Mus.* 40: 17-46.
Pinedo, M.C., 1985. Los Tettigoniidae de la peninsula Iberica, Espana insular y norte de Africa. 4. Subfam. Saginae Stal, 1874 (Orthoptera). - *Graellsia* 41: 167-172.
Pinedo, M.C., 1988. Los Tettigoniidae de las Sierras de Guadarrama, Gredos y zonas adyacentes. - *Eos* 64(1): 229-242.
Quidet, P., 1988. *Saga pedo* Pallas, une sauterelle qui pose des problèmes aux entomologistes. - *Bull. Soc. Sci. Nat. Nimes Gard* 58: 63-68.
Quidet, P., 1991. Un sauterelle qui pose des problèmes aux entomologistes *Saga pedo* Pallas (Orthoptera, Sagidae). - *Imago* 44(3): 23-30.
Racz, I., 1992. Orthopteren des Ungarischen Naturwissenschaftlichen Museums, Budapest. I: Tettigonidae. - *Folia Ent. Hung.* 53: 155-163.
Racz, I. & Z. Varga, 1985. Beiträge zur Kenntnis der Orthopteren-Fauna des Mecsek und Villány'er Gebirges, Ungarn. - *A janus Pannonius Múzeum Évkönyve* 29(1984): 29-35.
Rakonczay, Z. (ed.), 1989. *The Hungarian red data book.* - Akademia, Budapest.
Ramme, W., 1927. Die Dermapteren und Orthopteren Siziliens und Kreta. - Eos 3: 111-200
Ramme, W., 1951. Zur Systematik, Faunistik und Biologie der Orthopteren von Sudost-Europa und Vorderasien. 3. Revision der Gattung *Saga*. - Akademie Verlag, Berlin, 27 Band: pp. 172-191
Rosas, G., Ma. A. Ramos & A.G. Valdecasas, 1993. *Invertebrados espanoles protegidos por Convenios Internacionales.* - ICONA-CSIC, Col. Técnica. 250 pp.
Thorens, P. & A. Nadig (in prep.). Atlas de distribution des Orthoptères (Saltatoria) de Suisse. - *Doc. faun. helv.*
Us, P., 1992. *Fauna Orthopteroidea v Sloveniji.* - Slovenska akademija znanosti in umetnosti, Dela 32: 1-228.
Us, P. & S. Matvejev, 1967. Orthopteroidea. - *Catalogus Faunae Jugoslaviae* 3(6): 3-46.
Vickery, V.R. & Kevan, D.K. McE., 1983. A monograph of the Orthopteroid insects of Canada and adjacent regions. - *Mem. Lyman ent. Mus. Res. Lab.* 1: 11-679.
Voisin, J.-F., 1979. *Autoécologie et biogéographie des Orthoptères du Massif Central.* Thèse de Doctorat d'Etat, Université Pierre et Marie Curie (Paris-VI): xii+354 pp.
Voisin, J.F., 1979. *Catalcgue des Orthoptères du Parc National des Cevennes. 1. Introduction, Ensiferes, Tetrigides.* - *l'Entomologiste* 35(3): 117-126
Voisin, J.-F., 1992. *Atlas des Orthoptères de France. Etat d'avancement au 31-XII-1991.* 52 pp. Secrétariat de la Faune et de la Flore édit., Muséum National d'Histoire Naturelle, Paris [p. 30]
Xing-Bao, J. & X. Kai-ling, 1994. An index-catalogue of Chinese Tettigoniodea (Orthopteroidea: Grylloptera). - *J. Orth. Res.* 3: 15-41.

European experts:
Apart from entomologists who provided some general information on *Saga pedo*, as mentioned below, at the moment nobody is actively involved in studying this insect. Until recently Saginae were studied by Dr. A. Kaltenbach, Vienna, Austria, who retired some 10 years ago and is now commited to work on another group of Orthoptera. Below a list of Orthopterists who have a good understanding of the distribution of *Saga pedo* for their respective country or region possibly in addition to more general aspects (biology, ecology, life history, conservation)

Dr. V.Guseva, Lenin St. T.T./ Dept. Zool. Kibalchich str. 6, Block 5, GUS 129243 Moskau, Russian Federation
Dr. M. La Greca, Universita di Catania, Dipartimento di Biologia Animale, Via Androne 81, 95124 Catania, Italy. phone: +39 95 31 23 55; fax: +39 95 32 79 90
Mons. D. Morin, 29 rue d'Orphée, 34070 Montpellier, France
Dr. B. Nagy, Res. Inst. Plant Protection of the Hungarian Acad. Sci. H-1525 Budapest Pf. 102, Hungary. phone: +36 11 76 95 55; fax: +36 11 76 97 29
Ma. C. Pinedo, Mus. Nac. Cienc. Nat., Entomologia, c/ José Gutiérrez Abascal 2, E-28006 Madrid, Spain.
Dr. I. Racz, Kossuth Lajos University, Zoological Dept., H-4010 Debrecen, Egyetem ter 1, Hungary.
Mons. A. Schall, Maison Forestière, F-68150 Aubure, France.
Dr. P. Thorens, Insecta, Bureau d'étude des Invertébrés, Case Postal, CH-2002 Neuchâtel, Switzerland. phone/fax: +41 38 25 41 71

Dr. L. Vidlicka, Institute of Zoology, Slovak Akademy of Sciences, Dubravska cesta 9, 842068 Bratislava, Slovakia. phone: +42 07 378 22 27
Dr. J.-F. Voisin, Mus. Nat. d'Hist. Nat., 55 rue de Buffon, 75005 Paris, France. phone: +33 16 40 79 30 68
In addition the following persons kindly provided information which has been incorporated in this data-sheet: Dr. K. Adlbauer (Graz), Dr. L. Bigot (Marseille), Mons. H.E. Bomans (Taulignan), Dra. Ma. E. Clemente (Murcia), Dr. B. Defaut (Bédeilhac), Dr. P. Detzel (Stuttgart), Dr. Ph. Dreux (Paris), Mons. R. Fonfria (Eygaliéres), Mr. S. Gomboc (Beltinci), Dr. R. de Gregorio (Pau), Dr. R. Guilbot (Guyancourt), Dr. K.-G. Heller (Erlangen), Prof. Dr. L. Herrera Mesa (Pamplona), Drs. R. Kleukers (Triest), Dr. M. Lecoq (Montpellier), Dra. V. Llorente (Madrid), Dr. G. Luquet (Paris), Dr. A. Nadig (Chur).

Database:
France: Secrétariat de la Faune et de la Flore, 57 rue Cuvier, 75231 Paris Cedex 05. phone +33 40 79 32 74; fax +33 43 36 13 39

Data sheet compiler:
Drs. L.P.M. Willemse, c/o Dr. F. Willemse, Laurastraat 67, 6471 JH Eygelshoven, Netherlands. phone: +31 45 53 52 169

Compilation date: September 1995