Ethology and distribution of the "Hermit beetle" in France (Coleoptera, Cetoniidae, Trichiinae, Osmodermatini).

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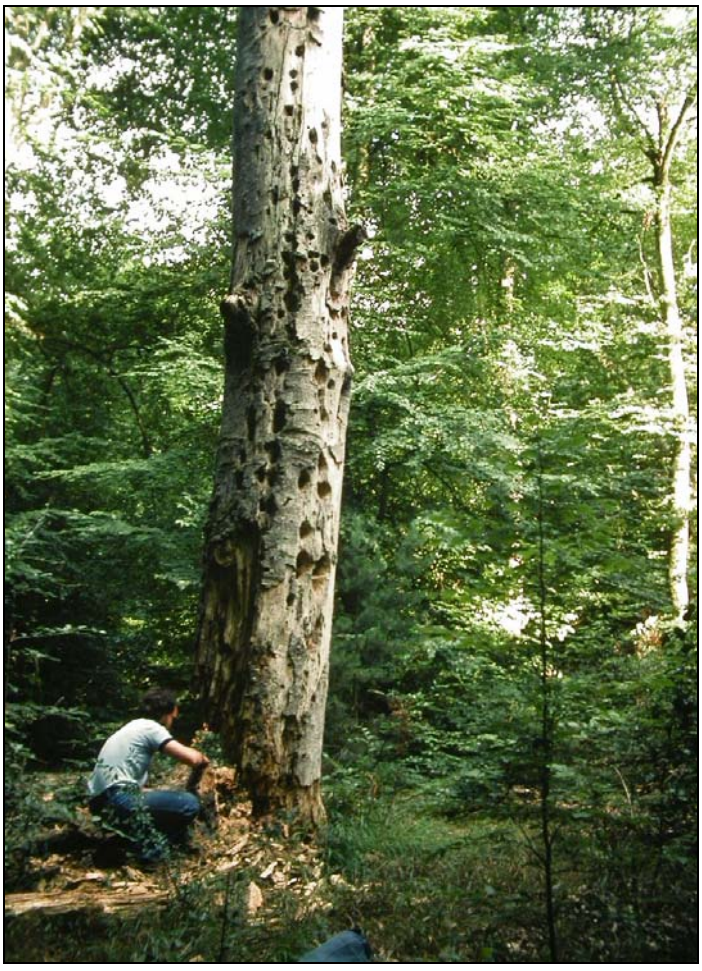
Abstract: Further information about the biology of the adult and the larva are given for the Trichiinae *Osmoderma eremita* (Scopoli) 1763 in France. Known range inside the French territory is actualized too and illustrated on a map.

Résumé: Des informations complémentaires sont données sur l'éthologie de la larve et de l'imago du Trichiinae *Osmoderma eremita* (Scopoli) 1763 en France. Sa distribution dans le territoire français est actualisée et illustrée sur une carte.

Key words: Coleoptera, Scarabaeoidea, Cetoniidae, Trichiinae, Osmodermatini, *Osmoderma eremita*, France, éthology, distribution.

Hermit beetle or *Osmoderma eremita* Scopoli, a saproxylic scarab beetle, is living in France as larva and adult, only in the hollows of old trees, as illustrated on the picture 1 showing a very old *Fagus sylvatica* in the Fontainebleau forest, hosted by the species.



Picture 1: Old *Fagus sylvatica* hosted by *Osmoderma eremita* in the Fontainebleau forest (biological portion of the "chêne brûlé") - Picture of D. PRUNIER.

Larvae are living normally at the base of cavity of large trunk tree, the decayed part of which had been reduced to a tan bark red, excrementitiously powder (see picture 2).

Picture 2: Larva L3 (last step, 55 mm length) and cocoons of Osmoderma eremita inside a large *Quercus robur* cavity. – Picture of D. PRUNIER.

The beetle is known for its characteristic odour, typically described as a “prune” fruity aroma (probably one explication of the strange French name “ pique-prune”) or sometime as “Russia leather” aroma. The odour emanating from one beetle is sometime so strong that it can be perceived from a distance of several meters by the human nose, and after many years of training, we discovered that we are able now to detect this particular smell in the hollow trees hosted by the species in the protected biological portions of the Fontainebleau forest.

According to LARSON M, HEDIN J., SVENSSON G., TOLASCH T. and FANCKE W. (2002), the characteristic odour coming from the Hermit beetle is caused by the compound (R) - (+) – γ - decalactone released in large quantities mainly by the male beetle, but we have verified that the release is done only 1 to 2 days after the emergence outside the cocoon.

The authors have shown by the way of field trapping experimentations, that (R) - (+) – γ – decalactone is a pheromone attracting the females, and they have written “ *Males may, thus, attract females dispersing from their natal tree by advertising a suitable habitat*”.
Hermit beetle antennae of the male and the female have both together special “electroantennographic” recordings, able to detect this pheromone.

Moreover, SVENSSON G., LARSSON M. and HEDIN J. (2003) verified that *Elater ferrugineus* larvae (Coleoptera, Elateridae) consume larvae of other saproxylic insects including *Osmoderma eremita.* They present evidence that the Elateridae adults (picture 3) use the pheromone odour produced by the Hermit beetle male, for the location of their prey.

Figure 3: *Elater ferrugineus* , predator of the *Osmoderma* larvae (35mm)-Picture of D. PRUNIER

About the question of the fertility of the species, only H. Sweetman and M. Hatch (1927), have published indications for O*smoderma eremicola* (Knoch),1801. According to theses authors, the number of eggs laid by the female range between 19 and 64 with a mean of 39 eggs.

We specially followed a female of *O. eremita* in a “vivarium” which laid 42 eggs during a period of more than one month, but only 34 gave larvae after 15 days of incubation period at 26° C constant temperature, and one another female freshly-laid 38 eggs during a period of time of 4 weeks. Each egg was protected individually by the female with an agglomerate of soil.

Having killed a female 3 days after the emergence of the cocoon, we opened her abdomen and checked the number of eggs included inside: only 18 rounded eggs were counted. This observation suggests that probably a female has more than one cycle of ovulation and, according to this hypothesis, we verify that a female is able to accept mating with many another males during a period of 40 days after the first copulation.

Eggs incubation period is around 14 to 21 days (large variations according to the level of temperature and hygrometry) with a mean of 17 days, linked with a constant temperature of 22° C. The egg, opaque white and spherical, increases his volume from 3mm to a 4/5 mm diameter and changes his colour to brown yellow a few days before hatching (picture n° 4). The first larva is 6 mm length.

Figure 4: eggs perfectly spherical, about 3mm (left) and 4/5 mm(right) in diameter and opaque-white - Picture of D. PRUNIER

Concentration of larvae could be important in nature, and we once encountered more than 60 little larvae at the same first stage L1 (length growing from 6mm to 16 mm) in an Oak cavity in the forest of Fontainebleau, but we don't know if they were coming from a single female.
It was seen too around 30 larvae at the stage L2 (length growing from 17mmm to 29mm) and L3 (length more than 30mm) in a large cavity of an old *Quercus* fallen down in the same forest (see the following pictures 5 and 6). Indicated sizes of the larvae depends of course of the quality and the conditions of environment.

Picture 5: sampling of Hermit beetle larvae in a cavity of an old *Quercus* cutting in the forest of Fontainebleau - Picture of D. PRUNIER.

Figure 6: Hermit beetle larvae collected in the above cavity – larvae L2, L3 and oval cocoons made of decaying wood particles tightly cemented together.
Picture of D. PRUNIER.

Larvae of a “melolonthiform” type, are characterized by the anterior border of the labium with 3 lobes, an anal slit transverse and not angular, and the latest sternite cover with silky spins irregularly arranged (see the following pictures 7 , 8 and 9).

Figure 7: larvae medium steep L3 in white *Fagus* wood - Picture of D. PRUNIER.

Figure 8: larva L3 of *Osmoderma eremita* (profil) Picture of D. PRUNIER (40mm)

Figure 9*:* larva L3 of *Osmoderma eremita* (face) : Picture of D. PRUNIER

They have a cycle of 2 to 3 years to reach their complete development (final step of L3 on picture 10). Duration is function of the quality and the conditions of environment and high temperature linked with a good level of hygrometry reduce the duration of the cycle.

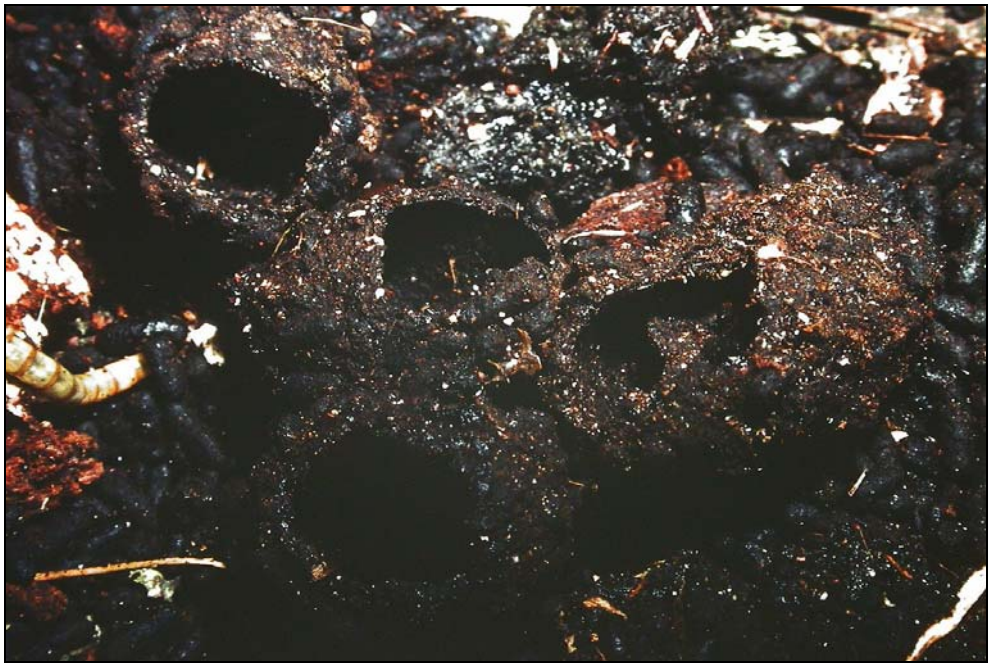
Picture 10: large L3 larva (final development, 50 to 55mm length). Picture of D. PRUNIER.

Cocoon step is often starting at the end of the second year, in September n+1; however nymph transformation is late and starts only during the following months of May or June n+2.

Picture 10: Transformation of *Osmoderma eremita* larva just before nymphosis. Picture of D. PRUNIER

These metamorphose finish generally in June/July n+2, and emergence of the cocoon occurs between July and early August in the Fontainebleau forest.

Nymph cocoon with an oval form (picture 11), is built with wood fragments found inside the cavity, strongly cemented by compost and one secretion of the larva constituted by a mix of faecal material and buccal secretion, which are laid with the help of the jaws.



Picture 11: open cocoons of Hermit beetles. Picture of D. PRUNIER.

A large proportion of the adults are not born (around 25% as estimated by counting the cocoons in numerous cavity), because they are parasitized as larvae or inside the cocoon mostly by Hymenoptera (picture 12) and Acariens, or sometimes by various white worms or killed by the Elateridae's larvae. Variation of the hygrometry inside the cavity is probably another explanation.

Picture 12: broken cocoon containing dead adult (parasitized by *Hymenoptera*). Picture of D. PRUNIER

Cycle of the adults is short and immediately after the emergence, males are searching for the females to copulate. In case of copulation in captivity, length of life of the male is short (10 to 20 days), that could be the explanation of the apparent greater number of females in nature. Females have been kept alive more than 3 months (102 days).

Adults appear in summer (July, August and early September) and are mostly nocturnal, but sometimes the adults hide during the day near the bases of trees as shown on the following pictures 13 and 14, or fly too when temperature is high.

Figure 13: Hermit beetle male adult hiding during the day.
Wonderful picture of R.COUTIN (O.P.I.E.)

Figure 14: Hermit beetle female adult
Other picture of R. COUTIN (O.P.I.E.)

Since 1994, ethology and detailed population patterns of the Hermit beetle have been investigated in Europe: TAUZIN (1994, 2000, 2002), LUCE (1995, 1996, 1999, 2001), PRUNIER (1999), RANIUS (2000, 2001, 2002,.., 2005), AUDISIO and al (2003), MURRIA E. and al (2004), and many others authors.

Results of the interesting studies of RANIUS indicate that low proportion of beetles leave their natal trees and disperse to other trees in the vicinity, using the strong odour as a signal, which could explain the mechanisms of the small dispersion of this discreet species.

Detailed known range only in the French territory is reported on the following attached table (enclosure 1) and the localities are plotted on the attached map (figure n°15). Most of these observations were done on the following old trees from hardwood forest, especially in the decaying wood of various species of Q*uercus* (*robur, ilex, rotundifolia, pyrenaica, humilis*) and *Castanea sativa* above all, and locally in the decaying wood of *Salix sp.*, *Prunus avium*, *Fagus sylvatica, Tilia sp., Betula sp., Alnus glutinosa,* sometimes in the decaying wood of *Platanus hybrida* (plane tree) and If (*Taxus baccata).*

Despite the reduction of the forests of tail trees, the species is known from many localities in France and remains abundant in some places, as:

- In the large biological protected portions (Le chêne Brûlé, La Tillae, Bas Bréau and Gros Fouteau) included in the Fontainebleau forest where it's possible to find a density of 160 trees with cavity per square kilometre, of which probably 10% contains larvae of *Osmoderma eremita*.

- Sometimes too in the chestnut-tree orchards or in various hardwood *Castanea* trees included in boscage where a density of 90-110 trees with cavities per square kilometre has been indicated in departments of Mayenne and Sarthe.

The emblematic species, host of cavities of old hardwood trees, is probably ranging all over French territory; nevertheless mainly in plains and hills (see the following map, figure 15). The knowledge of its range advance rapidly since the application in 1993 of the 92/43 CEE directive and after the "Natura 2000" studies.

The following list of observations is probably not exhaustive and many stations remain to be found in France, as proved by the new stations of *Osmoderma eremita* detected recently in the Gers department in South West of France (BRUSTEL & BRIN, 2003), during the impact study of the modification (enlargement) of the road which will be used by special trucks for the transportation of the Airbus A380's parts from the city of Bordeaux to the city of Toulouse.

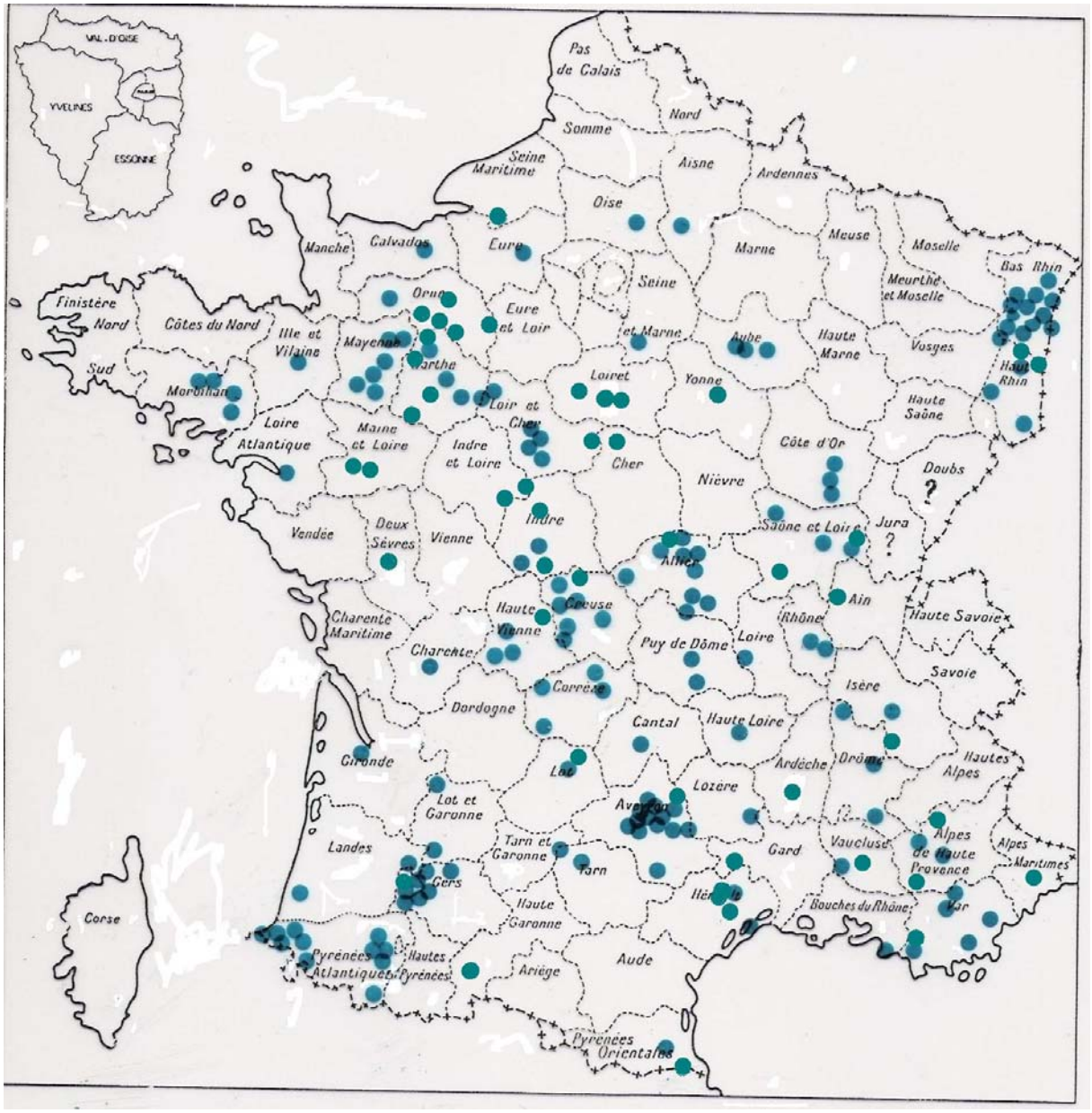


Figure 15: known observations (blue dots) of the Hermit beetle in French territory - updated November 2005

------- boundaries of the individual French departments.

In some departments, the lack of population could be explained by the destruction and the fragmentation of old-growth forests by the humans, particularly by the regrouping of land (French's agriculture present politic) and by the intensive cutting of the old full-grown tree by the public forest authority "Office National des forêts" (O.N.F.).

Indeed, the disappearance of the hedges or their replacement by exotic, shrubs concomitant with the now systematic chemical treatments of the agricultural zones, made it disappear from the modern rural landscape in many French communes. They remain only in the areas where the boscage is partitioned by old hedges.

In the "domanial" forests specially, the situation is even more alarming in places where the last evolutionary stage of the forest does not exist any more: trees often being cut down at half of their life expectancy and hollow shafts eliminated because of no commercial value. The replacement of the leafy trees by coniferous trees supplements this process of extinction.

The intensive cutting of the old hollow trees in the agricultural landscape has consequently rendered the beetle an endangered species in France.
It is indeed, an inhabitant of the last evolutionary stage of the forest and it represents an agent of the recycling of the woody matter. As mentioned by D.Prunier (1999), in a natural forest, wood does not have only the part to finish in boards, firewood or paper pulp but also to turn on the ground in order to restore its nutritive elements for the following generations. The forest humus is thus constantly fed by a vegetal and animal contribution, and a multitude of invertebrates is working at all the levels of this process. Each one has its speciality and makes use of a quite precise fraction of the resources available; thus many species live in association or as rivals and this apparently simple biotope utilizes a considerable number of actors who makes the richness of the forest biotope. In this diagram, *Osmoderma eremita* takes a considerable part in supporting regeneration by recycling.

Related to the status of the species in France, Hermit beetle (strangely named “pique-prune” or “barbot” in France) is actually protected in France since 22 July 1993 in relation with the 92/43 CEE directive (directive Habitats, as of 21 may 1992) and it's forbidden to destroy and capture the larvae and the adults (see below the law ***).

However, the current recommendation of the legislator is not completely adapted to the threat which weighs on the species, because it avoids tackling the true causes of the progressive extinction of the species, which is the systematic destruction of the old full-grown trees. The protection of the natural environment of the species has to be better formulated in the French law than to insist on the prohibition of collection.

*** *Extracted from the French law of July 22, 1993:*

"Are prohibited, on all the own territory and in any time, the destruction or the removal of the eggs, of the larvae and the nymphs, the destruction, the capture or removal, the preparation for purposes of collection of the insects according to or, which they alive or died, their transport, their hawking, their use, their setting on sale, their sale or their purchase: .(a list of species).....Pique-prune. Osmoderma eremita Scopoli ".

Enclosure 1: Known range of *Osmoderma eremita* in France, with the list of the observators and dates when available.

(Nc = collector not known, MNHNP=National Natural history Museum of Paris collection).
The table include the data base of the “Société Entomologique du Limousin” (L.Chabrol), and French sites of the Natura 2000 network.

Departments	Localities	Observatory/Information/ Collectors (in French)
Ain	Environs de Mâcon	Forêts à *Quercus robur*- 7/2003- site Natura 2000
Aisne	Soissons	Nc (coll. MNHNP)
Allier	Forêt de Grosbois	H. Piguet 7/1940
Allier	Moulins	R. Dufour 1969, chêne
Allier	Grannat	Nc (Coll. MNHNP)
Allier	Montluçon	P. Tauzin 8/1988 –piège aérien chêne
Allier	Vichy	Nc (Coll. MNHNP)
Allier	Broût Vernet	Nc (Coll. MNHNP)

Allier	Forêt de Moladier	P. Tauzin 8/1973, 1ex. sur vieux chêne pédonculé
Allier	Forêt de Tronçais- Isle-et-Bardais	Hêtraies 8/2002- site Natura 2000
Alpes-de-Haute-Provence	Noyers-sur-Jabron	Coache & Gompel, 8/1995 piège à bière
Alpes-de-Haute-Provence	Environs de Venterol	7/2004 dans hêtraies. Site Natura 2000
Alpes-de-Haute-Provence	Esparron-de-Verdon	Forêt à *Quercus ilex*- 8/2003- site Natura 2000
Alpes-de-Haute-Provence	Environs de Digne	Coache >1995
Alpes-Maritimes	Caussols au Nord de Grasse	Sur *Quercus ilex*- 8/2005- site Natura 2000
Ardèche	Berrias-et-Casteljau- environ Les Vans	Sur *Quercus rotundifolia*- 7/2005- site Natura 2000
Ardèche	Without locality	Au Musée d'Ormaison (Aude), il existe dans la collection 1 exemplaire portant l'indication Ardèche.
Aube	La Vacherie	Nc (coll. MNHNP)
Aube	Berres	1952, Roussin
Aube	Troyes	1928, Roussin
Aube	Foicy-Chapelle Saint-Luc	G. Legrand, 1861 sur saules
Aveyron	Belmont sur Rance (Sud Aveyron)	H. Brustel, L. Valladares >2000
Aveyron	Bertholène	O. Montreuil, L.Valladares >2000
Aveyron	Bozouls	H. Brustel >2000
Aveyron	Canet-de-Salars	L.Baliteau >2000
Aveyron	Gaillac-d'Aveyron	L. Baliteau >2000
Aveyron	Gabriac	O .Montreuil >2000
Aveyron	Laissac	O. Montreuil >2000
Aveyron	Montrozier	H. Brustel, L.Valladares >2000
Aveyron	Mostuejouls (Causse Méjean)	7/2002 sur *Quercus* - site Natura 2000
Aveyron	Palmas	H. Brustel, L. Valladares >2000
Aveyron	Pierrefiche	H. Brustel, L Valladares >2000
Aveyron	Salles-la-source (causse du Comtal)	H. Brustel, L. Valladares >2000
Aveyron	Sebazac-Concoures	H. Brustel >2000
Aveyron	Séverac-l'Eglise	L.Baliteau >2000
Bas-Rhin	La Robertsau (env. Strasbourg)	Scherdlin
Bas-Rhin	Matzenheim	Fettig
Bas-Rhin	Herrenwald (près de Vendenheim)	Sorel
Bas-Rhin	Saverne	Klein
Bas-Rhin	Strasbourg (ville)	Bourgeois, Reiber, Pflüger, Scherdlin, Silbermann.
Bas-Rhin	Forêt de Haguenau	Bourgeois, Mathieu, Kampmann, Silbermann
Bas-Rhin	Furdenheim	(in L. Gangloff)
Bas-Rhin	Oberschaeffolsheim	(in L. Gangloff)
Bas-Rhin	Brumath	(in L. Gangloff)

Bas-Rhin	Griesheim	Klein
Bas- Rhin	Ile des Epis- petit Rhin	Scherdlin (MNHNP)
Bas-Rhin	Barr	Klein
Bas-Rhin	Mutzig	(in L. Gangloff)
Bas-Rhin	Forêt de Neuhof	(in L. Gangloff)
Bas-Rhin	Plobsheim	(in L. Gangloff)
Bas-Rhin	Niederbronn	(in L. Gangloff)
Bas-Rhin	Illkirch	(in L. Gangloff)
Bas-Rhin	Forêt d' Illwald- environ de Selestat	7/2003- site Natura 2000
Bas-Rhin	Marlenheim	L. Gangloff
Bas-Rhin	Hohfrankenheim	L. Gangloff
Bouches-du-Rhône	Marseille (Nord-est)	M. Eberlé/P. Tauzin plusieurs imagos sur plaie de chêne pédonculé- 7/1966
Calvados	St Aubin sur Algöt	Nc (coll. MNHNP) 7/1965
Cantal	Le Rouget (environ Aurillac)	J.P. Paris (23/7/1989), 1 imago dans chemin forestier bordé de châtaigniers
Charente	Angoulème	A. Laforgue
Cher	Aubigny-sur-Nère (sud de Gien)	Sur *Quercus robur* - 7/2002
Corrèze	Brive-la-Gaillarde (centre ville)	J. Thebaud , sur tilleuls en 1992
Corrèze	Lubersac	Dumont
Corrèze	Forêt de la Cubesse (commune d'Ambrugeat)	L. Baliteau (28/08/2001) 1 imago mâle + débris dans 2 arbres creux.
Corrèze	Lieu-dit Lafont (commune de Meymac)	Cousin (2001)
Cote-d'Or	Dijon	Nc (Coll. MNHNP)
Cote-d'Or	St Loup de la Salle (Beaune)	Nc (Coll. MNHNP)
Cote-d'Or	Beaune	P. Tauzin 8/1982 dans carie de chêne
Creuse	La Celle-Dunoise	Alluaud, 8/1910
Creuse	Bourganeuf- entre Lanjouy et laforêt-Belleville	P. Cochen 7/1986, 4 ex.
Creuse	Vigeville	M. Bouvier, 1987 et 1988
Creuse	Fresselines – environ Aigurande-Vallée de la Creuse	Sur *Quercus robur*- 7/2001- site Natura 2000
Creuse	Commune d'Ars- Les Ribières, 20km Bourganeuf	Leblanc, 1 ex. écrasé sur la route.
Creuse	Hameau de la rochette (commune de Ladapeyre)	Jean (8/1934)
Deux-Sèvres	Azay-sur-Thouet	1945
Drôme	Lens Lestang	P. Malet , 7/1949
Drôme	Aucelon	R. Allemand , piège aérien 7/1988
Drôme	Montauban-sur-Ouvèze, Les Blaches 1200m	R. Allemand, piège aérien 7/1986

Eure	Miserey	Nc (coll. MNHNP)
Gard	Dourbies (environ Lanuejols-Massif de l'Aigoual)	Sur Quercus-7/2003- site Natura 2000
Gers	Averon-Bergelle	H. Brustel >2000
Gers	Cazaubon	H. Brustel >2000
Gers	Condom	J. Gardère <1900
Gers	Estang- région Armagnac	Sur *Quercus ilex*- 7/2005- site Natura 2000
Gers	Eauze	J. Gardère <1900
Gers	Espas	H. Brustel >2000
Gers	Manciet	H. Brustel >2000
Gers	Marguestau	H. Brustel >2000
Gironde	Talence-Bois de Thouars	P. Tauzin 7/1972 et 1974. A vue sur chênes.
Haute-Garonne	Barbazan au sud de Saint-Gaudens	Forêt à *Quercus ilex*- 7/2002- site Natura 2000.
Haute-Loire	Ville du Puy (jardin Henri Vinay dans saule blanc)	Maneval (1930-1942) , Bardin (1945-1950). Biotope détruit depuis selon une information de C. Bouyon 2002
Haut-Rhin	Colmar	Silbermann, Kampmann
Haut-Rhin	Artzenheim –bordure du Rhin-environ Colmar	8/2002- site Natura 2000
Haut-Rhin	Leymen	Gehrig
Haute-Vienne	Champagnac-La-Riviere : La Flavinie, bois des Essarts	L. Chabrol, 7/1998
Haute-Vienne	Vallée de la Gartempe	8/2004 sur *Quercus* - Site Natura 2000
Haute-Vienne	Thouron	G. Veyriras, 1950
Haute-Vienne	Limoges Nord- Beaubreuil	P. Tauzin, 7/1974, 1 ex. femelle
Hérault	Brissac-Mastargues	Arpad & Foucart, 16/6/1987
Hérault	St Martin-de-Londres (entre Le mas de Bouis et Cazarils)-	J. Y. Rasplus (in Tassi & al)
Hérault	Viols-le-Fort	Mourgues M., 8/07/1975 dans souche pourrie de *Q.ilex.*
Hérault	Notre Dame de Londres-Georges de l'Hérault	7/2005 sur *Quercus* - Site Natura 2000
Hérault	Frouzet (env.St- Martin-de-Londres)	Arpad & Foucart 20/6 au 6/8/1987 dans *Quercus humilis*.
Hérault	Montpellier nord	Nc (coll.MNHNP) 1900-1950
Ile-et-Vilaine	Rennes	Nc (coll.MNHNP)<1900
Indre	Environs d' Argenton	Nc (ancienne coll.Dubreuil) <1950
Indre	Forêt de Saint-Benoit-du-Sault	7/2002 Site Natura 2000
Indre	Boisschaut-sud, commune de Chaillac, canton de St-Benoît-du-Saut	R. Dohogne 2002 (débris dans vieux chêne)
Indre	Deols- environ Chateauroux	7/2005- site Natura 2000

Indre-et-Loire	Mosnes –environ Amboise	Sur *Quercus robur* -7/2004- site Natura 2000
Indre-et-Loire	Perrusson- St Hippolyte (environ Loches)	Sur *Quercus robur* -7/2004- site Natura 2000
Isère	Grenoble	Nc (coll.MNHNP)
Isère	La Chapelle-en-vercors (environ Gresse)	Hêtraies- 8/2002- site Natura 2000
Landes	Gabaret	H.Brustel >2000
Landes	Linxe (Ouest de Castets)	Nc (coll.MNHNP) 1900-1950
Loire	Tourraines	Nc (coll.MNHNP)
Loire-Atlantique	Nantes (banlieue Nord)- vers route d'Orvault	P. Tauzin, M. Pouliquen , A. Roques , sur vieux platanes déhiscents 6/1971 à 7/1974
Loire-Atlantique	2 autres stations non communiquées, une est certainement la station de Nantes, où *O.eremita* aurait été observée en nombre dans des vieilles futaies de chênes lors de la construction du domaine universitaire	S.Charrier
Loir-et-Cher	Vendôme	Nc
Loir-et-Cher	Forêt de Blois	Nc
Loir-et-Cher	Forêt de Russy	Nc
Loir-et-Cher	Salbris (Sologne)	7/2004 sur *Quercus robur*- site Natura 2000
Loir-et-Cher	Chailles	Nc
Loir-et-Cher	Forêt de Grosbois	Nc
Lot	Limargue- Bio	Fleurent. Piège à lumière UV, 12/7/1987
Lot	Albiac- environs de Gramat	7/2004 sur *Quercus ilex*- site Natura 2000
Loiret	Sully-sur-Loire (Forêt d'orléans)	Dans carie sur *Quercus robur* - 7/2004- site Natura 2000
Loiret	Lailly-en-val (environs d'Orléans)	Chênaies à *Quercus robur* et *Quercus pyrenaica*- 7/2004- siteNatura 2000
Loiret	Chateauneuf-sur-Loire	7/2004- site Natura 2000
Lot-et-Garonne	Sos	Bauduer <1900
Lot-et-Garonne	Saint Vivien	Nc (Coll.MNHNP) >1900-1950
Lozère	Entre Villefort et Pied de Borne	Nc (Coll. MNHNP) 1900-1950
Maine-et-Loire	Bocage de Blaison – environs d'Angers	8/2000- site Natura 2000
Maine-et-Loire	Chalonnes-sur-Loire- environs d'Angers	8/2003- site Natura 2000

Mayenne	Communes de la région des Avaloirs (NE du département)	D. Landemaine 2004- Chênes et châtaigniers
Mayenne	Javron les chapelles-La grande Jouillère	H. Mazurier, 8/1992
Mayenne	Communes de la région des Coëvrons (environ de Evron)	D.Landemaine 2004- Chênes et châtaigniers
Mayenne	Commune de Changé (Châtaigniers)	D. Landemaine 15/7/2002
Mayenne	Ville de Mayenne	T. Daum, 1978
Mayenne	Ruillé froids fonds	Barou, 31/10/1972, 2 ex. morts dans un grenier !
Morbihan	Malestroit , Les sources. Chemin de Halage du canal de Nantes à Brest	Y. Gomy, <1950 (coll. Doguet)
Morbihan	Reguigny	G. Boullet, 14/8/1965
Morbihan	Ploërmel- Etang-aux-ducs	D. Prunier
Morbihan	La Bottine- hameau Radenac	R. Vincent, 8/1968 1ex.mort à terre
Oise	Forêt de Compiègne	P. Tauzin, larves et débris d'imagos dans carie de chêne tronçonné et stocké sur la D602 près de Vieux Moulin (9/1982).
Orne	Gacé	Vergers de pommiers 7/2003- site Natura 2000
Orne	La Cochère (environs du Haras National du Pin)	Bocages à châtaigniers- 7/2001- Site Natura 2000
Orne	Barville (environs de Le Mêle-sur-Sarthe)	Bocages à châtaigniers- 8/2000- Site Natura 2000
Orne	La-Lande-sur-Eure (environs de Boissy-Lès-Perche)	Veilles chênaies à *Quercus robur* - 7/2004- site Natura 2000
Orne	Coulonges-sur-Sarthe (haute vallée de la Sarthe)	Chênaie pédonculée- 8/2004 site Natura 2000
Orne	Medeny	Nc coll.MNHNP
Puy-de-Dôme	St Germain Lembron	Nc coll.MNHNP
Puy-de-Dôme	Clermont Ferrand	Rivières
Pyrénées-Atlantiques	Aïnhoa	H. Piguet, 8/1974
Pyrénées-Atlantiques	Parc du château de Pau	Prunier, Freeman et Van Meer >2000
Pyrénées-Atlantiques	Macaye	D. Prunier 1950-2000
Pyrénées-Atlantiques	St Jean de Pied de Port (château Pignon)	D. Prunier 1950-2000
Pyrénées-Atlantiques	Eaux chaudes-val d'Ossau	Thuillard 1950-2000
Pyrénées-Atlantiques	Billère (banlieue Ouest de Pau)	J.L. D'Hondt 1950-2000
Pyrénées-Atlantiques	Caubios-Loos (12km Nord de Pau)	J.L. D'Hondt 1950-2000
Pyrénées-Atlantiques	Nay	Freeman >2000
Pyrénées-Atlantiques	Massif de la Rhune, Forêt de Sare	C.Van Meer >2000
Pyrénées-Atlantiques	St Pée- sur- Nivelle	H. Brustel , 8/2000
Pyrénées-Atlantiques	Urrugne	C.Van Meer >2000
Pyrénées-Orientales	Forêt de La Massane	Nc (coll. MNHNP) 1900-1950
Pyrénées-Orientales	Massif des Albères	Dans hêtraies- 7/2005 site Natura 2000

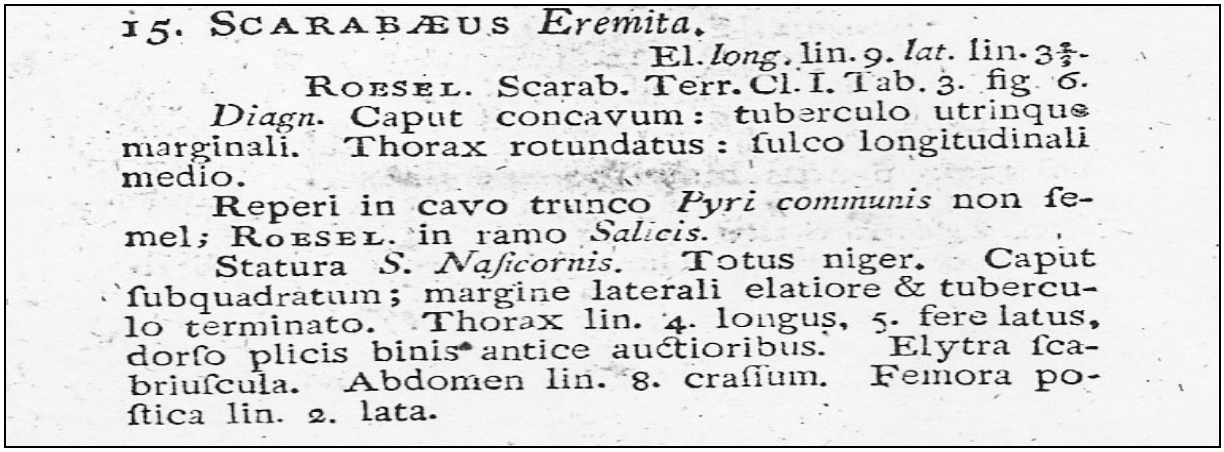
Rhône	Pollionnay	Nc coll.MNHNP
Rhône	Courzieu (Monts du Lyonnais)	Bobichon (dans vieux cerisier) 1950-2000, biotope détruit depuis
Rhône	Tour ND de Fourvières (Lyon)	Nc coll. MNHNP
Seine-et-Marne	Forêt de Fontainebleau (parcelles Bas Breau, la Tillae, gros Fouteau, mare aux fées, Chêne brûlé)	Observations régulières par plusieurs entomologistes de 1948 à 2005.
Seine-Maritime	Secteur d'Anneville-Ambourville	Information dans l'Echo des boudes (Parc naturel régional des bouches de la Seine normande)- août 2005
Saône-et-Loire	Cortevaix	Blanchard (22/6/2003), Sorlet (24/6/2003) dans vieux tilleuls.
Saône-et-Loire	Autun	Fauconnet- loc.cl. *semirufum* <1900
Saône-et-Loire	Branges (Basse Seille)- environs de Louhans	Larves 5/1995- site Natura 2000
Saône-et-Loire	Sainte Foy- vallée de la Belaine- Mont du Charolais	7/2003- site Natura 2000
Saône-et-Loire	Igé	R.Vincent, 18/7/1993, 1ex. près de tilleuls creux.
Sarthe	Forêt de Bercé et bocages environnants	JM.Luce, P.Tauzin (dans chêne *Quercus robur* et châtaigniers *Castanea sativa*). >1995
Sarthe	Forêt de Vibraye (50km Est du Mans)	J. Bobichon
Sarthe	Vivoin (Nord de la Sarthe)	H. Brustel >2000
Sarthe	La flêche	Dans carie châtaigniers- 7/2003- site Natura 2000
Sarthe	Parennes à l'est d'Evron	Châtaigniers dans bocage-7/2003 site Natura 2000
Sarthe	Montigny, environs d'Alençon au nord de la forêt de Perseigne	Châtaigniers dans bocage-7/2003 site Natura 2000
Sarthe	Ecommoy (sud du Mans)	Châtaigniers dans bocage- 7/2003 site Natura 2000
Sarthe	Environs de Saint-Calais	D. Landemaine 2004-
Tarn	Albi	Olier (in Gavoy) <1950
Tarn-et-Garonne	Saint Antonin-Noble-Val	Bayrou (1930)
Var	Massif de la Sainte Beaume	C. Bouyon (1973) 1 larve dans hêtre, Moragues, Brustel (larves dans Ifs creux). site Natura 2000.
Var	Plan d'Aups- Massif de la Sainte Beaume	Dans Hêtraies 7/2003- site Natura 2000.
Var	Massif des Maures- environs de Le Luc-route de Cogolin	H. Simon (2000)- Autre observation sur *Quercus ilex* le 7/2005. site Natura 2000.
Var	Aiguines- Gorges du Verdon Grand Margés	14 collectors (1950-2005)…… site Natura 2000.
Var	Verignon (Haut Var)	J. Bobichon, observation régulière de l'espèce entre 1990 et 2000.

Var	Bagnols	H. Caillol 1913
Vaucluse	Auribeau – environ Apt- Lubéron	7/2004 sur *Quercus ilex*- site Natura 2000.
Vaucluse	Malocène	V. Ferriot : 6ex. capturés sous écorce d'un vieux platanes dans la ville.
Vendée	1 localité (non communiquée)	S. Charrier >1990
Yonne	Noyers sur Serein (SE de Auxerre), région Bourgogne	B. Delquie, captures à vue en juillet 2004 et le 19 juillet 2005- Platanes

Others stations are known too in Vendee and Loire Atlantique departments, according to CHARRIER S. (personal comm.), but we never received the true localities inside these two French departments.

Enclosure 2: Scan of the original description of Johann Anton SCOPOLI, 1763.

In Entomologia Carniolica exhibens insecta Carnioliae indigena et distributa in ordines, genera, species, varietates. Methodo Linnaeana. Vienne:I. T.Trattner.



15. SCARABÆUS *Eremita*.

El. *long*. lin. 9. *lat*. lin. 3⅓.

ROESEL. Scarab. Terr. Cl. I. Tab. 3. fig. 6.

Diagn. Caput concavum: tuberculo utrinque marginali. Thorax rotundatus: ſulco longitudinali medio.

Reperi in cavo trunco *Pyri communis* non ſemel; ROESEL. in ramo *Salicis*.

Statura *S. Naſicornis*. Totus niger. Caput ſubquadratum; margine laterali elatiore & tuberculo terminato. Thorax lin. 4. longus, 5. fere latus, dorſo plicis binis antice auctioribus. Elytra ſcabriuſcula. Abdomen lin. 8. craſſum. Femora poſtica lin. 2. lata.

SCOPOLI described the species with specimen coming from Carniola (small mountains actually in North West Slovenia). As a result of the destruction of the Scopoli's collection in 1866 during a shipwreck (Horn & Kahle, 1935), neotype has been designated in 1993, with a male well preserved, aedeagus prepared and labelled as follows:

"Florence" handwritten on white paper,
"Firenze, Italie" handwritten on white paper,
"ex. collection Bellier" with type label on white paper,
"Museum Paris ex. Oberthur" with type label on white paper,
and my neotype red label handwritten.

This specimen has been deposited in the collection of the national museum of natural history of Paris.

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Figure 16: Another Hermit beetle male adult from central Europe hiding during the day.
Wonderful picture of Josef HLASEK (www.hlasek.com)-
(probably *Osmoderma lassallei s.sp. septentrionale* more rugose)