Genere RUSSULA

Persoon : Fr.

Persoon 1796, *Obs. Myc.*, 1: 100
Fries 1821, *Syst. Myc.*, 1: 54

Diagnosi originale

Pileus carnosus, utplurimum depressus; lamellae longitudine aequales.

Typus: Lectotypus, *R. emetica* (Schaeff. : Fr.) Pers. (designato da Burlingham 1915, N. Amer. Fl., 9: 201).

DEFINIZIONE DEL GENERE

Carpoforo formato da cappello, gambo ed imenoforo lamellare. **Cappello** variabile fra i 20 (-30) mm delle forme lillipuziane ed i 200 (-250) mm delle forme più robuste, da globoso a espanso, poi spesso crateriforme, di rado umbonato, con il margine ottuso o acuto, da liscio a più o meno nettamente e lungamente scanalato o scanalato-tubercolato. Cuticola da adnata e poco differenziata a più o meno ampiamente (di rado interamente) asportabile, umida e brillante, talvolta perfino glutinosa, altrimenti asciutta ed opaca, vellutata, pruinosa, unita o rotta in areole di varia ampiezza, in qualche caso ricoperta da uno strato velare. Pigmenti spesso vivaci (rosso, porpora, violetto, verde, giallo, bruno, etc.) ad esclusione delle forme discolori, da subuniformi a variamente mescolati, talvolta smorti, sui toni ocra, ocra fulvastro, tuttavia congenitamente assenti nei gruppi che fanno capo al subgen. *Compactae*, dove si affaccia solo secondariamente una coloritura a macchie via via più estese, da ocra a ocra brunastro, bruno ruggine, grigio nerastro, passando talvolta per un certo rossore (necropigmenti). **Lamelle** uguali o inframezzate da numerose lamellule, quasi sempre fragili o molto fragili, in casi eccezionali elastiche o perfino lardacee, da libere a raramente un po' decorrenti, di vario spessore e spaziatura. **Sporata** da bianca a giallo carico, passando per i diversi gradi intermedi. **Piede** confluente con il cappello, solitamente centrale e ben differenziato, carnoso, da molto corto a ben slanciato, subcilindrico, un po' rastremato, clavato, talvolta svasato sotto le lamelle, pieno, lacunoso o cavernoso, secondo la specie e il grado di sviluppo, liscio, rugoso o vellutato al tocco, fondamentalmente bianco, qualche volta lavato o macchiato di rosa-rosso, di violetto, di grigio, di verde-grigio, di giallo citrino, in qualche caso punteggiato di bistro nerastro, raramente fornito di un velo a struttura granulosa o aracneiforme (residui limitati alla base o occupanti un'ampia superficie), perfino anuliforme in qualche sezione tropicale. **Carne** più o meno putrescibile, in nessun caso secernente lattice, da soffice ed esigua (soprattutto in certe sezioni tropicali) a spessa e più o meno dura, bianca, talvolta pigmentata sotto superfici intensamente colorate, immutabile, più o meno nettamente ingiallente, imbrunente, arrossante, ingrigente o annerente. Sapore mite, piccante, amaro, astringente (etc.); odori molto variabili, talvolta insignificanti o assenti. La trama consta di isole di sferocisti tra sistemi di ife connettive comprendenti laticiferi tipici (contenuto e reazioni chimiche identici ai macrocistidi) ed ife oleifere a contenuto giallastro omogeneo. **Spore** da subglobose a obovoidi, a più o meno nettamente allungate, da molto piccole (5-6 µm) a molto grandi (fino a 14-15 µm), con ornamentazione amiloide alquanto variabile per il rilievo e il disegno complessivo (da finemente verrucose a marcatamente echinulate, possibilmente crestate, da parzialmente a interamente reticolate). **Basidi** di regola clavati e tetrasporici, incidentalmente con due o tre sterigmi, per eccezione bisporici (tre sole specie europee attualmente conosciute). **Cistidi** (macrocistidi) da molto piccoli e cilindracei a voluminosi, ed allora fusiformi o clavati, con o senza appendici, ripieni di un

materiale lipidico corpuscolato e rifrangente che si colora di grigio o di nero con i reattivi solfoaldeidici; ma in qualche specie la reazione è negativa e nelle *Amoenula* i cistidi ("*peli cistidiformi*") si mostrano inerti ed otticamente trasparenti. **Trama dell'imenoforo** di tipo misto, con numerosi sferocisti. **Cuticola** a tre strati più o meno evidenti, quello superficiale (epicutis) formato da ife terminali otticamente trasparenti (peli) molto variabili per forma e spessore, quasi sempre accompagnate da dermatocistidi e/o ife primordiali incrostate, in casi eccezionali anche da crini a parete rigida e spessa. Pigmento variabile, vacuolare, granulare, membranario più o meno incrostante, in certi casi, si presume, protoplasmatico e finemente disperso.

Si tratta di specie micorriziche di molte essenze forestali, tra cui Conifere (*Picea, Abies, Pinus, Larix, Cedrus, Tsuga, Pseudotsuga*), diverse Cupulifere (*Quercus, Castanea, Fagus, Carpinus, Corylus*), ma anche Salicacee (*Salix, Populus*), Betulacee (*Betula, Alnus*), Tiliacee e Cistacee. A parte i *Salix* e il *Dryas*, la cui importanza deve ritenersi pienamente dimostrata, alcune russule della zona alpina si ritrovano in associazione con *Ligusticum*, *Juncus*, *Chrysanthemum*, *Helianthemum*, *Alchemilla*, etc. (per alcune di queste piante è ipotizzabile una semplice commensalità). Molte specie esotiche si assocerebbero a *Leguminosae, Nyctaginaceae, Polygonaceae*. - Secondo Singer 1986, il genere *Russula* comprenderebbe almeno "317 specie ben conosciute" a livello planetario. Tuttavia, al momento, questo numero deve ritenersi superato di oltre un centinaio di unità (soprattutto a seguito delle ricerche di B. Buyck nel centro Africa).

CLASSIFICAZIONE ADOTTATA DALL'AUTORE

GENERE RUSSULA Pers. : Fr.

Sottogenere COMPACTAE (Fr.) Bon

Sez. **COMPACTAE** Fries [*Nigricantes* (Bataille) Konrad & Joss.]
Sez. **ARCHAEINAE** Heim ex Buyck & Sarnari, emend.
Sez. **LACTARIOIDES** (Bataille) Konrad & Joss. (*Plorantes* Singer non Bataille)

Sottogenere HETEROPHYLLIDIA Romagnesi, emend.

Sez. **HETEROPHYLLAE** Fries
subsez. ***Cyanoxanthinae*** Singer (*Indolentes* Melzer & Zvara)
subsez. ***Heterophyllae*** (Fries) J. Schaeffer
subsez. ***Griseinae*** J. Schaeffer
subsez. ***Ilicinae*** (Romagn.) Buyck
Sez. **VIRESCENTINAE** (Singer) Sarnari
Sez. GRISEOFLACCIDAE Sarnari ad int.

Sottogenere AMOENULA Sarnari

Sottogenere INGRATULA Romagnesi

Sez. **INGRATAE** (Quélet) Maire
subsez. ***Farinipedes*** Singer
subsez. ***Foetentinae*** (Melzer & Zvara) Singer
Sez. **SUBVELATAE** Singer
Sez. **FISTULOSAE** (Heim ex Singer) Buyck (extraeuropee)
Sez. **FELLEINAE** (Melzer & Zvara) Sarnari, emend.

Sottogenere RUSSULA, emend.

Sez. **RUSSULA**, emend.
subsez. ***Russula***, emend.
subsez. ***Consobrinae*** Sarnari
subsez. ***Sardoninae*** Singer, emend.
subsez. ***Violaceinae*** (Romagnesi) Sarnari
subsez. ***Urentes*** Maire, emend.
subsez. ***Rubrinae*** (Melzer & Zvara) Singer, emend.
Sez. **VISCIDINAE** (Sarnari) Sarnari
Sez. **POLYCHROMAE** Maire, emend. (subgen. *Polychromidia* Romagn. p.p.)
subsez. ***Xerampelinae*** Singer
subsez. ***Melliolentinae*** Singer, emend.
subsez. ***Integriforminae*** Bon, emend.
subsez. ***Paraintegrinae*** Sarnari
subsez. ***Auratinae*** Bon
Sez. **PARAINCRUSTATAE** Sarnari
subsez. ***Integrae*** Maire, emend.
subsez. ***Lepidinae*** (Melzer & Zvara) Singer
Sez. **TENELLAE** Quélet (subgen. *Tenellula* Romagn.)
subsez. ***Puellarinae*** Singer
subsez. ***Rhodellinae*** (Romagn.) Bon
subsez. ***Laricinae*** (Romagn.) Bon, emend.
subsez. ***Betulinae*** (Romagn.) Sarnari (*Sphagnophilae* Singer)
Sez. **MESSAPICAE** Sarnari (o subgen.? verso *Macowanites*)

Sottogenere INCRUSTATULA Romagnesi, emend.

Sez. **LILACEINAE** (Melzer & Zvara) Konrad & Joss. (*Incrustatae leucosporae* Romagn.)
subsez. ***Lilaceinae*** (Melzer & Zvara) J. Schaeffer
subsez. ***Roseinae*** Singer ex Sarnari, emend.
Sez. **AMETHYSTINAE** Romagnesi, emend. (*Incrustatae xanthosporae* Romagn. p.p.)
subsez. ***Amethystinae*** (Romagn.) Bon
subsez. ***Chamaeleontinae*** Singer
subsez. ***Integroidinae*** Romagnesi in Bon
subsez. ***Olivaceinae*** Singer

N.B.: I ranghi inferiori a quello di sottosezione (serie e stirpe), da noi proposti ma non validati, sono passati in rassegna e commentati nei capitoli che seguono, all'interno dei rispettivi sottogeneri.
Per quanto riguarda le sezioni e le sottosezioni non contrassegnate dall'indicazione "emend.", il senso da noi adottato (circoscrizione assegnata al taxon) è, in linea generale, quello di Romagnesi 1967. Per tali casi deve considerarsi dunque sottintesa la voce "emend. Romagn.".

KEYS TO THE SUBGENUS, SECTIONS, SUBSECTIONS

1a Context hard, chalky, browning or blackening, sometimes preliminarily reddening, fruit bodies initially white, then changing like the context, pileus margin smooth, long incurved, lamellulae very abundant, cystidia and basidia slim, pigment vacuolar ..... **(subgen. COMPACTAE) 4**

1b Taste often acrid or unpleasant, smell usually strong, spore print cream, rarely white, margin of pileus often strongly striate or gelatinous (if margin smooth cf. *Consobrinae* in 20a), stipe with large cavities, colours dull, reddish-ochre to grey-brown, pigment often intraparietal or incrusting, veil sometimes present ..... **(subgen. INGRATULA) 5**

1c Colours usually bright, red, green, violet, brown, yellow, etc., lamellulae rare **2**

2a Dermatocystidia absent everywhere, epicutis hyphal ends big and subulate, pileus and stipe velvety, hymenium with empty pseudocystidia not greying or blackening with SBA ..... **subgen. AMOENULA**

2b Pileus green and/or violet, rarely brown, never red, epicutis with dermatocystidia not septate (but they lack in *Virescentinae*), basidia and cystidia slim, spores usually very small, without an amyloid spot, pigment granular, taste mild or slightly acrid in unripened lamellae ..... **(subgen. HETEROPHYLLIDIA) 8**

2c Not with the above combination of characters **3**

3a Epicutis with primordial hyphae ("not incrusted" in *Olivaceinae*), dermatocystidia absent in the pileus, taste mild ..... **(subgen. INCRUSTATULA) 10**

3b Epicutis with or without incrusted dermatocystidia, rarely including primordial hyphae. Dermatocystidia present at least in stipe cortex if epicutis consisting only of hairs ..... **(subgen. RUSSULA) 13**

4a Context blackening, sometimes preliminarily reddening, spores with thin ornamentation, without an amyloid spot, spore print white (at least in european species), pileocystidia usually very small and with diverticulate tips, rarely absent, pigment vacuolar and brownish ..... **sect. *Compactae***

4b Habitus lactarioid with a very short stipe, context slightly browning, spore print cream or exceptionally yellow (also white in some exotic species), spores usually with an amyloid spot ..... **sect.** Lactarioides

4c Lamellae mostly very distant, habitus hygrophoroid or sect. *Compactae*-like, spore print white, context more or less browning, sporae tiny, lacking an amyloid spot, with very thin ornamentation hardly visible in M.O., cystidia slim and almost cylindrical ..... **sect. *Archaeinae***

5a Margin of the pileus blunt (habitus like in subgen. *Russula*), spore print white, sporae with amyloid spot, dermatocystidia well characterized, irregularly cylindraceous and septate, incrusted by a thin yellow pigment solidified ..... **sect. *Felleinae***

5b Margin of the pileus acute to subacute, lamellae sometimes weeping, spore print creme, rarely white, sporae usually lacking amyloid spot **6**

6a A brownish-yellow arachnoid veil present at least at stipe base, reacting bright red with KOH ..... **sect. *Subvelatae***

6b Veil absent, no reddening reaction with KOH ..... **(sez. *Ingratae*) 7**

7a Pileus yellow-ochre, spore print white, dermatocystidia very large and spindle-shaped ..... **subsect. *Farinipedes***

7b Pileus tawny-ochre to smokey-brown, to ashy-grey, smell generally strong, unpleasant or pleasant, spore print cream, dermatocystidia lanceolate or also spindle-shaped, often with a small rounded capitulum, but small and sometimes tiny ..... **subsect. *Foetentinae***

8a Base of cutis terminal ends and subcutis consisting of spherocysts, dermatocystidia absent on pileus (at least in european species) but present on stipe, pileus surface furfuraceous and areolate ..... **sect. Virescentinae**

8b Subcutis consisting of thin hyphae, epicutis with dermatocystidia ..... **(sect. *Heterophyllae*) 9**

9a Lamellae fatty or elastic, spore print white, context not turning pink with $FeSO_4$, then slowly greyish green, terminal hyphae and dermatocystidia very thin, the latter not turning blue in SV, hyphae strongly metachromatic with Cresyl Blue ..... **subsect. *Cyanoxanthinae***

9b Lamellae elastic in youth, taste mild, context somewhat browning or yellowing, turning bright-orange with $FeSO_4$, dermatocystidia poorly characterized, not turning blue in SV ..... **subsect. *Heterophyllae***

9c Lamellae fragile, often with a slightly acrid taste, spore print cream, ochre, exceptionally white or light yellow, epicutis consisting of well characterized dermatocystidia, terminal hyphae of the epicutis often formed by short inflated cells ..... **subsect. *Griseinae***

9d Lamellae more or less fragile, often with a slightly acrid taste, epicutis consisting of hair-like hyphal ends and cylindraceous dermatocystidia, spore print cream to dark ochre ..... **subsect. *Ilicinae***

10a Spore print white or whitish ..... (**sect. *Lilaceinae***) **11**

10b Spore print yellow, rarely ochre ..... (**sect. *Amethystinae***) **12**

11a SV causing a persistent bright reddening in dried fruit bodies, pileus pinkish red or with a shade of orange ..... **subsect. *Roseinae***

11b SV causing an undistinctive reaction, never bright red in dried specimens, pileus with variable colours ..... **subsect. *Lilaceinae***

12a Usually found under broadleafed trees, fruit bodies sturdy, context thick, becoming purplish with Phenol, primordial hyphae somewhat well-characterized but not incrusted ..... **subsect. *Olivaceinae***

12b Found under conifers, pileus pruinose or somewhat velvety, primordial hyphae wide 6-9 (11) µm, cortex of stipe lacking cells turning blue with SBA ..... **subsect. *Amethystinae***

12c Fruit bodies mostly medium-sized, context sometimes greying or blackening, hyphal ends more or less cylindric on epicutis, cortex of stipe containing cells blackening with SBA ..... **subsect. *Integroidinae***

12d Hyphal ends on epicutis clavate, cortex of stipe containing cells blackening with SBA, cuticle not pruinose or sometimes initially shining ..... **subsect. *Chamaeleontinae***

13a A yellowish veil present at least at the base of the stipe, instantly reddening with KOH **14**

13b Veil absent, base of stipe not reddening with KOH **15**

14a Fruit bodies very small-sized, with habitus like *Tenellae* (*Rhodellinae*), spore print light yellow, taste mild ..... **sect. *Messapicae***

14b Fruit bodies sturdy, spore print white or cream, taste usually slightly acrid ..... **sect. *Viscidinae***

15a Fruit bodies small and slim, context somewhat soft and fragile, turning blue with Gayac, margin of the pileus striated, taste usually mild, dermatocystidia with many septa, not incrusted (a very thin incrustation may occur in some species with a yellow spore print), basidia mostly short ..... (**sect. *Tenellae***) **16**

15b Taste usually acrid or very acrid, epicutis containing well characterized dermatocystidia ..... (**sect. *Russula***) **19**

15c Fruit bodies mostly medium, rarely small-sized, context firm, taste often fairly mild, epicutis containing incrusted or smooth dermatocystidia (lacking only in *Auratinae*), primordial hyphae sometimes present **22**

16a Basidia not larger than 50 × 12 µm, context yellowing or almost unchanging, never greying **17**

16b Basidia up to 60 × 14 µm, mostly found under coniferous or birches **18**

17a Pileus mostly red or orange, context slightly yellowing or unchanging (strongly yellowing only in *R. arpalices*) ..... **subsect. *Rhodellinae***

17b Pileus variably coloured, context somewhat yellowing, at times with a scent of fruit or *Pelargonium*, stipe usually white .... **subsect. *Puellarinae***

18a Spore print cream or ochre, stipe often pinkish, found mostly under birches ..... **subsect. *Betulinae***

18b Spore print yellow, context sometimes becoming grey or slightly grey-brown (strongly yellowing only in *R. sapinea),* usually found under coniferous trees ..... **subsect. *Laricinae***

19a Dermatocystidia without incrustations **20**

19b Epicutis with incrusted dermatocystidia, taste very acrid, context usually not turning blue with Gayac ..... **subsect. *Rubrinae***

20a Pileus grey to olive brown (colours like series *Pectinata*), margin fairly sharp-edged and smooth, spore print cream, context greying, ***also*** slightly reddening, turning pink with Formalin .... **subsect. *Consobrinae***

20b Colours bright, red, violet, green, etc., combinations of characters different from the former (20a) **21**

21a Spore print white, possibly cream in some species with somewhat yellowish pileus, no scent of *Pelargonium* ..... **subsect. *Russula***

21b Spore print cream, scent more or less strong like *Pelargonium*, stipe never pink, context greying or slightly yellowing .... **subsect. *Violaceinae***

21c Context somewhat stiff, spore print cream or ochre (white only in *R. luteotacta*), stipe often pinkish or lilac, lamellae mostly adnate or subdecurrent, sometimes weeping, found under coniferous or birches (but some species with red pilei grow in deciduous forests) .... **subsect. *Sardoninae***

21d Spore print yellow, rarely ochre (in this case stipe never pink), lamellae neither decurrent nor weeping ..... **subsect. *Urentes***

22a Epicutis lacking primordial hyphae, dermatocystidia with or without incrustations (but *Auratinae* have dermatocystidia only in the cortex of stipe) (sez. *Polychromae*) **23**

22b Epicutis containing both incrusted hyphae and dermatocystidia .... **(sect. *Paraincrustatae*) 25**

23a Dermatocystidia absent in epicutis (the latter consisting only of hyphal ends), but present in stipe cortex, context never turning purple with Phenol ..... **subsect. *Auratinae***

23b Epicutis with dermatocystidia not incrusted **24**

23c Epicutis with incrusted dermatocystidia, spore print yellow or ochre ..... **subsect. *Paraintegrinae***

24a Context browning with age and greening with $FeSO_4$, lamellae reddening with Aniline, smell tardily of herrings .... **subsect. *Xerampelinae***

24b Context yellowing or browning with age, but $FeSO_4$ and Aniline reacting differently from the preceding *Xerampelinae* (24a), dried fruit bodies smelling often of honey, never of herrings, sporae rounded and finely decorated, dermatocystidia with many septa and an emulsion-like content .... **subsect. *Melliolentinae***

24c Dermatocystidia not or poorly septate (except in species with strongly yellow-browning context and echinulate sporae), spore print yellow, ochre, rarely cream, context somewhat browning, rarely blackening, smell neither of herrings nor of honey when drying, reacting differently from *Xerampelinae* (24a) with $FeSO_4$ and Aniline ..... **subsect. *Integriforminae***

25a Spore print yellow (but cream-ochre in *R. tyrrhenica*), context moderately browning or blackening .... **subsect. *Integrae***

25b Spore print pale cream, context hard, taste bitter or somewhat minty in lamellae, cystidia of pileus and hymenium not blackening with SBA ..... **subsect. *Lepidinae***

SOTTOGENERE COMPACTAE
(Fries) Bon

(Fries 1838, *Epicrisis*: 349) Bon 1986, Doc. Myc., 65: 53.

Diagnosi originale

Pileus undique carnosus, unde margo primo infractus semper exstrius, absque pellicula viscosa discreta (unde color non variabilis sed ex aetate et jove tantum mutatur). Caro compacta, firma. Stipes solidus, carnosus. Lamellae inaequales.

Typus: *R. nigricans* Fries (designato da Singer 1951, *Agaricales*, Ed. I: 703).

CARATTERI GENERALI

Corpo fruttifero carnoso, di consistenza dura, almeno nella fase giovanile, biancastro all'origine, in seguito macchiato di ocra, di bruno bistro, di nerastro, margine pileico acuto, rigido, mai solcato, rivestimento poco differenziato e generalmente asciutto. Lamellule intercalari sovrabbondanti, sporata bianca, per eccezione crema o gialla. Spore quasi sempre prive di tacca amiloide. Basidi tendenzialmente stretti. Epicutis a dermatocistidi spesso mal caratterizzati, poco o per niente settati. Pigmento vacuolare ad instaurazione tardiva, particolarmente appariscente nelle forme a carne annerente (necropigmento). Velo sempre assente.

Sez. COMPACTAE Fries
- serie *Acrifolia* ad int.
- serie *Atramentosa* ad int.
- serie *Albonigra* ad int.

Sez. LACTARIOIDES (Bataille) Konrad & Josserand

Sez. ARCHAEINAE Heim ex Buyck & Sarnari, emend.

Sezione COMPACTAE Fries

Fries 1838, *Epicrisis*, 1838: 349

Diagnosi originale

Pileus undique carnosus, unde margo primo infractus semper exstrius, absque pellicula viscosa discreta (unde color non variabilis sed ex aetate et jove tantum mutatur). Caro compacta, firma. Stipes solidus, carnosus. Lamellae inaequales.

Typus: *R. nigricans* Fries (designato da Singer 1951, *Agaricales*, Ed. I: 703).

CARATTERI GENERALI

Carne annerente e talvolta preliminarmente arrossante, sporata bianco puro (anche crema in qualche specie esotica). Spore prive di tacca amiloide, in generale finemente reticolate. Basidi slanciati come in *Heterophyllidia*, mediamente 35-60 × 6-11 µm. Epicutis comprendente ife terminali più o meno spesse. Dermatocistidi presenti o assenti, abitualmente piccoli e di forma caratteristica (terminazione spesso arborescente o diverticolata), a contenuto granulare disperso. Necropigmento vacuolare bruno, tardivo ma appariscente.

serie *Atramentosa* ad int.

Epicutis omogenea di grossi peli, senza dermatocistidi, superficie del cappello asciutta e talvolta vellutata, carne rapidamente annerente senza arrossare.

serie *Acrifolia* ad int.

Epicutis contenente dermatocistidi in generale piccoli e più o meno dispersi, talvolta difficili da localizzare (come in certe forme di *R. adusta* e *R. nigricans*), con terminazione arborescente o diverticolata nelle forme ben tipiche.

serie *Albonigra* ad int.

Dermatocistidi a terminazione banale, senza biforcazioni o diverticoli, contenenti un materiale rifrangente insensibile ai reattivi solfoaldeidici. Il contenuto dei cistidi imeniali ha le medesime caratteristiche fisico-chimiche. Sapore delle lamelle rinfrescante, non acre.

KEY to the SPECIES of Section COMPACTAE

1a Hymenial cystidia not turning black with SBA, pileocystidia comparatively large, never forked at the apex, enclosing oil drops not blackening with SBA, taste of menthol in lamellae, spores showing a very thin network with warts not exceeding 0,2 µm, context quickly blackening (first strongly reddening then blackening in fo. *pseudonigricans*) ..... ***R. albonigra***

1a Not with the above combination of characters **2**

2a Epicutis lacking evident dermatocystidia, lamellae crowded, pileus dry or velutinous, context never reddening when cut (series *Atramentosa*) **3**

2b Epicutis with dermatocystidia, but poorly characterized, very scattered and at times easily overlooked **5**

3a Lamellae having a slightly refreshing taste, never acrid, spores 7-9 × 5,4-7 µm, cortex of stipe lacking oleiferous hyphae SBA+, found under deciduous and evergreen oaks (cf. *R. anthracina* var. *insipida* Romagn. nom. inval., with insipid lamellae and spores 8-10 × 6,5-8 µm) ..... ***R. atramentosa***

3b Taste distinctly acrid at least in lamellae, lamellar sinus showing a more or less slight pinkish tinge, oleiferous hyphae SBA+ occurring in stipe cortex **4**

4a Spores 8-9,7 × 6,7-8 µm ..... ***R. anthracina*** var. ***carneifolia***

4b Spores 6,7-8,5 × 5,5-7 µm, lamellar sinus having a well distinct pink tinge ..... ***R. anthracina*** var. ***anthracina***

5a Fruit bodies sturdy and fleshy, lamellae thick and very distant (much less so in fo. *heterophylla* ad inter.) with a sinus shaded pale ochre, context strongly reddening before blackening (reddening weak or absent, later slowly blackening in fo. *subadusta* ad inter.), hyphal ends cylindric, 3-7 µm wide (more irregularily shaped, with inflated cells up to 12 (18) µm in fo. *megatricha* ad inter.) ..... ***R. nigricans***

5b Found mostly under coniferous trees on sandy soil, also under broadleafed trees according to some Authors, fruit bodies sturdy and fleshy, lamellae distant with age, taste mild, context turning slowly very pale pink, then grey, spores finely reticulate, almost smooth ..... ***R. adusta***

5c Not with the above combination of characters **6**

6a Taste very acrid at least in lamellae, pileus 60-150 mm broad, subviscid, mostly turning reddish brown, context reddening before blackening when cut (soon blackening and with a blackish grey pileus in fo. *pseudofuliginosa* ad inter.), hyphal ends cylindric 3-4,5 µm wide [sinuous and 7-12 (15) µm wide, with dermatocystidia 5-7 µm wide and pileus on average with more ochre-brown tinges in var. *heteropellis* ad inter.] ..... ***R. acrifolia***

6b Taste mild to faintly acrid, pileus differently coloured, lamellae always crowded **7**

7a Context not turning red, lamellae white **8**

7b Context initially reddening, lamellae with a cream tinge, taste mild to slightly acrid, pileus 30-70 mm broad, mostly dry, milk and coffee coloured, sometimes with a slight olivaceous tinge, hyphal ends 6-12 µm wide ..... ***R. densifolia***

8a Terminal elements of pileus hyphae cylindrical, spores comparatively oblong, 7,2-8,8 × 5,6-7 µm, pileus 50-100 mm broad ..... ***R. fuliginosa***

8b Terminal elements of pileus hyphae subulate, spores subglobose 6,5-7,2 (7,7) × 5,7-6,5 (7) µm, pileus 40-65 mm broad, context sometimes hardly reddening ..... ***R. densissima***

Sezione LACTARIOIDES (Bat.) Konr. & Joss.

(Bataille 1908, *Fl. Mon. Astér*: 63) Konrad & Josserand 1934, Bull. Soc. Mycol. Fr., 50: 263

Diagnosi originale

Chapeau compact, à marge enroulée, charnue et lisse, souvent tomenteuse; lamelles inégales et simples, parfois larmoyantes; chair ordinairement grenue, plus o moins succulente, souvent noircissant avec l'âge.

Typus: *R. delica* Fries (designato da Shaffer R.L. 1964, *Mycologia*, 56: 203).

CARATTERI GENERALI

Cappello ruvido, da pulvinato a crateriforme, biancastro, poi macchiato di ocra ruggine, gambo cortissimo, carne imbrunente all'aria (ad eccezione di qualche specie esotica). Sporata molto variabile, da crema pallido (Ib, IIa), come in *R. delica* e *chloroides*, al giallo di *flavispora* (ma una *R. fuegiana* del sud America avrebbe la sporata puramente bianca). Spore con tacca sovente almeno in parte amiloide. Basidi stretti, ad esclusione di qualche specie macrospora. Epicutis contenente dermatocistidi cilindracei piuttosto sottili (questa sezione si identifica con *Plorantes* Singer, non Bataille).

KEY to the SPECIES of Sect. LACTARIOIDES

1a Subcutis embedded in a gelatinous matrix having bluish shades, sporal ornamentation with long ridges forming a network like in *R. romellii* (cf. also *R. gelatinascens* Singer) ..... ***R. chloroides*** var. ***glutinosa***

1b Not with the above combination of characters **2**

2a Spore print whitish cream (Ib-IIa) **3**

2b Spore print dark cream (IIc-d) **5**

2c Spore print yellow, taste burning ..... ***R. flavispora***

3a Pileus irregular, with a flat-bottomed depression, stipe very short, lamellae comparatively broad and distant, sporal ornamentation consisting of a partial network with ridges and clustered warts, mostly on calcareous soil ..... ***R. delica*** var. ***delica***

3b Lamellae comparatively broad and distant, but pileus regular and with a more or less narrow funnel-shaped depression, spores like in *R. chloroides* ..... ***R. chloroides*** var. ***trachyspora***

3c Pileus crater-like at last, lamellae narrower and more crowded **4**

4a Stipe tending to be taller, spores 8-11,2 × 7,2-8,8 µm (var. *parvispora* has spores about 6,4-8 × 6-7 µm and context sometimes slightly reddening with $FeSO_4$) ..... ***R. chloroides*** var. ***chloroides***

4b Pileus pure white at the beginning, smooth and slightly silky, margin thin, spores 7,5-9 × 6,5-7 µm, showing an entire network of thin lines, found on calcareous soil (not strictly ?) ..... ***R. delica*** var. ***puta***

5a Taste mild, then bitterish and astringent, odour of fruit, cystidia very slowly greying with SV (10-20'), sporal ornamentation consisting of small warts, at least partially reticulated. ..... ***R. pallidospora***

5b Taste moderately acrid, odour raphanoid, cystidia quickly blackening with SV, found especially under *Pinus* ..... ***R. littoralis***

5c Spores sparsely aculeate, taste moderately acrid (northern species insufficiently confirmed) ..... ***R. pseudodelica***

Sezione ARCHAEINAE Heim ex Buyck et Sarnari

sect. nov. emend.

Diagnosi

Peridio gibberoso vel depresso, cremeo vel e rufo ochraceo. Lamellis plus minusve raris, crassis, angustis, anastomosis, lamellulis intermixtis. Carne dura, brunnescenti vel subimmutabili. Sapore e dulci acri. Sporis in cumulo albidis, parvissimis, verrucis amyloideis, saepe parum manifestis. Basidiis cystidiisque angustissimis, cylindratis. - Typus: R. archaea *Heim.*

Typus: *R. archaea* Heim.

CARATTERI GENERALI

Portamento igroforoide o di sez. *Compactae*, più che di *Lactarioides* (almeno nelle specie europee), cuticola pileica adnata e assai poco differenziata, scabrosa, carne più o meno nettamente imbrunente, lamelle tendenzialmente spaziate, sapore da dolce a nettamente acre, sporata bianca. Epicutis contenente dermatocistidi piccolissimi, talvolta non localizzabili, spore prive di tacca amiloide, minuscole e il più delle volte assai finemente ornate (in particolare nelle forme europee ed africane), basidi e cistidi ugualmente piccolissimi.

KEY to the SPECIES of Section ARCHAEINAE

1a Small species growing in central Africa, pileus not too fleshy, with a translucid crenulate margin (cf. also *R. parvulospora* Buyck) ..... ***R. archaea***

1b Fruit bodies fleshy, without translucid margin, found in Europe **2**

2a Found in fresh mixed woods of subalpine and transalpine zones, feature *Hygrophorus*-like, due to the subdecurrent very thick and distant lamellae, context turning red with $FeSO_4$, subcutis showing frequent inflated cells sometimes reaching the surface, hyphal ends often clavate, up to 6-8 µm wide or even wider ..... ***R. camarophylla***

2b Found under *Quercus suber* in the Mediterranean area, lamellae moderately distant, context turning light pinkish orange with $FeSO_4$, subcutis and cutis lacking inflated cells, hyphal ends very thin, 2-4 µm wide, spores slightly bigger, ornamentation more prominent than in the preceding species (2a) ..... ***R. archaeosuberis***

SOTTOGENERE HETEROPHYLLIDIA

Romagnesi

Romagnesi 1987, Doc. Myc., 69: 39, emend.

Diagnosi originale

Sapore dulci vel lentissime acri, nisi interdum in lamellis. Sporis albis vel cremeis, rarissime pallide ochraceis. Fere semper dermatocystidiis (haud septatis, excepta sect. Virescentinae *et* Amoeninae*), nunquam hyphis primordialibus; pilis epicutis saepe subulatis ac multiseptatis, specie eximia. Plerumque pigmento granuliformi obscuro in his pilis; pigmento vacuolari rubro solum in sect.* Amoeninae. - *Typus:* R. grisea *Fr. (ss. Gillet)*

Typus (originale): *R. grisea* Persoon ex Fries.

Specie carnose dal margine pileico poco o niente scanalato, gambo tendenzialmente corto e attenuato, cappello più o meno verde o violetto, raramente brunastro, talvolta pallidissimo. Sapore dolce o subpiccante nelle lamelle dei soggetti immaturi. Carne generalmente inodore. Spore prive di tacca amiloide. Basidi slanciati, non più larghi di 10 (12) µm. Rivestimento del cappello contenente dermatocistidi unicellulari (salvo le *Virescentinae*, la cui specie tipo è provvista di epicutis omogenea). Pigmento granulare in grossi grani verde nerastro abbondanti nella subcutis, presente almeno in tracce anche nelle forme pallide o discolori. Ife debolmente metacromatiche in Blu di Cresile. Tuttavia, nel caso delle *Cyanoxanthinae*, la metacromasia risulta particolarmente accentuata, sotto forma di grossolane incrostazioni. Le *Griseoflaccidae* ("*Griseoflaccidinae*" Sarnari, 1993 ad inter.) hanno un habitus da *Tenellae*.

Sez. HETEROPHYLLAE Fries
- subsez. ***Cyanoxanthinae*** Singer
- subsez. ***Heterophyllae*** (Fries) J. Schaeffer
- subsez. ***Griseinae*** J. Schaeffer
- subsez. ***Ilicinae*** (Romagn.) Buyck

Sez. VIRESCENTINAE (Singer) Sarnari

Sez. GRISEOFLACCIDAE Sarnari ad int.

Sezione HETEROPHYLLAE Fries

Fries 1863, *Mon. Hymen. Suec.*: 193

Diagnosi originale

Pileus carnosus, firmus vel rigidus, margine tenui primo inflexo, dein expanso, striato, pellicula tenui subadnata tectus. Lamellae multae breviores longioribus intermixtae, aliae furcatae, tenues. Stipes solidus, validus, intus demum spongiosus.
Stirps inter R. furcatas *et* fragiles *media, ab utrisque aegre limitanda.* Furcatis *proximae sunt n°19-21;* Fragilibus *n° 22-24.*

Typus (automatico): *R. heterophylla* (Fries : Fr.) Fries

CARATTERI GENERALI

Questa sezione comprende *Heterophyllidia* con epicutis a dermatocistidi e subcutis filamentosa (in pratica l'intero gruppo, ad esclusione delle *Virescentinae*). I restanti caratteri sono quelli del sottogenere di appartenenza.

Subsez. CYANOXANTHINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 240.

Diagnosi originale

Hut kahl, mit ± aderiger Oberfläche, schmierig lila oder grün, auch etwas rötlich. Rand scharf. Geschmack mild oder ± scharf. Sporenstaub I. Bau elastisch (viele filamentöse Hyphen in Fleisch, Trama, Subhymenium). Fleisch unveränderlich weiß, mit $FeSO_4$ - Lösung meist schwach reagierend (wenigstens R. cyanoxantha*), lamellenanordnung bisweilen regelmäßig.*

Typus (automatico): *R. cyanoxantha* (Schaeffer) Fries.

Specie fornite di lamelle lardacee, sporata bianca, carne dolce, qualche volta di sapore sgradevole o un po' piccante, vagamente ingrigente nelle forme più tipiche, inerte al $FeSO_4$ (ma la tacca si tinge alla lunga di verde-grigio), lamelle che si macchiano tardivamente di arancio a contatto con l'Anilina. Epicutis gelificata, formata da peli sottilissimi, a dermatocistidi minuscoli e dispersi. Ife fortemente metacromatiche in Blu di Cresile.

KEY to the SPECIES of Subsect. CYANOXANTHINAE

1a Pileus cuticle areolate-cracked at least at the margin, the remaining characters like in 3c (weathered collections due to persistent rains, more frequent on clayey soil) ..... ***R. cyanoxantha*** fo. ***cutefracta***

1b Pileus cuticle never cracked **2**

2a Taste more or less acrid, odour unpleasant but fugacious (characters not well fixed) ..... ***R. cyanoxantha*** var. ***variata***

2b Taste mild, odour and taste not unpleasant **3**

3a Pileus lemon yellow to green yellow; spores "6,5-7,5 (8,5) × 5,7-6,5 (6,7) µm (fide Romagnesi) ..... ***R. cyanoxantha*** var. ***flavoviridis***

3b Pileus from the beginning olive green ..... ***R. cyanoxantha*** fo. ***peltereaui***

3c Pileus violaceous or with green patches, context turning slowly green with $FeSO_4$ ..... ***R. cyanoxantha*** fo. ***cyanoxantha***

3d Stipe mostly with a tinge of lilac, lamellae cream, context quickly green with $FeSO_4$, epicutis occasionally with inflated cells (probably a form of *R. cyanoxantha*) ..... ***R. langei***

Subsez. HETEROPHYLLAE (Fries 1863, *Mon. Hymen. Suec.*: 193) J. Schaeffer 1933, Ann. Mycol., 31: 318 ("*Heterophyllinae*").

Diagnosi originale
Pileus carnosus, firmus vel rigidus, margine tenui primo inflexo, dein expanso, striato, pellicula tenui subadnata tectus. Lamellae multae breviores longioribus intermixtae, aliae furcatae, tenues. Stipes solidus, validus, intus demum spongiosus.
Stirps inter R. furcatas *et* fragiles *media, ab utrisque aegre limitanda.* Furcatis *proximae sunt n°19-21;* Fragilibus *n° 22-24.*

Typus (automatico): *R. heterophylla* (Fries : Fr.) Fries.

Specie a carne tardivamente un po' ingiallente o imbrunente, rosso-arancio vivo con $FeSO_4$, sapore interamente dolce, sporata bianca o crema, dermatocistidi piccolissimi e dispersi.

KEY to the SPECIES of Subsect. HETEROPHYLLAE

1a Spore print cream, pileus honey brown or tawny brown to dark brown, epicutis lacking subulate hair-cells, found in mountain coniferous forests, very rarely under deciduous trees (*Fagus*) ..... ***R. mustelina***
1b Spores print white, epicutis with rigid, subulate, thick-walled hair-cells near the center of the pileus **2**
2a Spores not exceeding 7 × 5,6 µm, pileus greenish (fo. *heterophylla*), lemon yellow (var. *chlora* ss. Romagn.), brownish (fo. *adusta*), partially orange (fo. *laeticolor*), wholly ivory cream (fo. *virginea*), lamellae forked and anastomosing at stipe attachment ..... ***R. heterophylla***
2b Spores up to 8 × 6 µm, pileus lilac to violaceous brown, rarely light green (fo. *viridata*) or whitish (fo. *lactea* ss. Auct., non ss. Fries) ..... ***R. vesca***

Subsez. GRISEINAE J. Schaeffer 1933, Ann. Mycol., 31: 318.

Diagnosi originale
(Wechselfarbig-) grüne Hellsporer mit stumpferem Rand.

Typus (automatico): *R. grisea* Persoon ex Fries.

Specie a lamelle fragili, il più delle volte piccantine all'assaggio nei soggetti immaturi, spore piccole che solo per eccezione oltrepassano 8,5 × 6,5 µm, dermatocistidi voluminosi e ben caratterizzati, annerenti a contatto dei reattivi solfoaldeidici, peli più o meno voluminosi e articolati. Reazione variabile al $FeSO_4$, in genere banale, tuttavia energica nella specie tipo *R. grisea*.

KEY to the SPECIES of Subsect. GRISEINAE

1a Habitus *Tenellae*-like, spore print IIa-c ..... (*Griseoflaccidae* ad inter.)
1b Normally facies and consistency *Griseinae*-like **2**
2a Spore print light yellow, IIIc to IVa-b, spores large, reticulate measuring 7,6-9,6 × 6,4-8 µm, big synantropic species having a mild taste (if spores almost smooth cf. *R. werneri*) .. ***R. ochrospora***
2b Spore print pure white (white-spored *Griseinae*) (cf. *R. vesca* and *R. heterophylla*, having poorly characterized dermatocystidia and context orange-reddish with $FeSO_4$) **3**
2c Spore print cream, exceptionally ochre **4**
3a Colours of pileus and spores like in *R. vesca*, taste acrid, dermatocystidia with septa, lower cells of hyphal ends subisodiametric (species not confirmed) ..... ***R. johannis***
3b Taste entirely mild, pileus with violet and green colours, mostly under *Picea* (cf. also *R. leucospora*, possibly conspecific) ..... ***R. variegatula***
4a Sporal ornamentation with tiny warts 0,1-0,25 µm high, hyphal ends 3-6 µm wide, pileus variegated with violet, green, brown colours, stipe clavate (when stipe shortly obconic, sometimes with an olive grey tinge, odour weak of fruit and resin, taste a little refreshing and astringent in lamellae, cf. var. *subostreata* ad inter.) ..... ***R. sublevispora***
4b Found under mountain conifers on sandy soil, occasionally also under deciduous trees (*Fagus*), pileus honey-brown to fulvous brown, fruit bodies thick-set, context bright orange with $FeSO_4$, spores large, variably crested, hyphal ends 3-7 µm wide, dermatocystidia poorly characterized (in subsect. *Heterophyllae*) ..... ***R. mustelina***
4c Not with the above combination of characters **5**
5a Context not turning pink with $FeSO_4$, hyphal ends cylindrical, 2-3-4 µm wide, spores at least partially reticulate ..... (cf. *R. helgae*, *R. werneri*, *R. ilicis* in subsect. *Ilicinae*)
5b Context turning pink with $FeSO_4$, pileus pure green, hyphal ends with few septa, only 3-4 (6) µm wide, spore print IIb-c (if spore print IIIa-b, cf. *R. medullata*) **6**
5c Spore print pale cream (IIa), hyphal ends thick, made up of short, inflated cells, 5-10 µm wide, mostly found under *Fagus* ..... ***R. ionochlora***
5d Not with the above combination of characters **7**
6a Dermatocystidia cylindric, 4-7 µm wide, partially capitate, spores oblong more or less cristulate, found under birches or in coniferous woods (cf. subsect. *Ilicinae*) ..... ***R. aeruginea***
6b Dermatocystidia clavate, 6-9 µm wide, (never capitate according to Romagnesi), spores cristulate to locally subreticulate (cf. green forms of *R. grisea*), very rare species found under deciduous trees ..... ***R. stenotricha***
7a Found under birches, spores entirely reticulate and with tiny warts, dermatocystidia septate ..... ***R. betulae***
7b Hyphal ends (5) 6-9 (12) µm wide, spore print cream, II(b) c-d (cf. *R. ionochlora* with spore print IIa), $FeSO_4$ reaction medium to almost negative, never strong **8**
7c With different characters, hyphal ends only 4-6 µm wide **14**
8a Sporal ornamentation showing isolated warts, found under *Cistus* or in deciduous woods, mostly oaks **9**
8b Spores with some ridges sometimes forming a partial network, context turning pink with $FeSO_4$ (in case of next to negative reaction cf. *R. atroglauca*) **10**
9a Found under *Cistus monspeliensis*, pileus green, 20-50 (70) mm broad, usually neither scurfy nor cracked, hyphal ends 4-7 (9) µm wide, made up of relatively long cells ..... ***R. monspeliensis*** var. ***monspeliensis***
9b Found under *Cistus* shrubs bordering *Quercus suber* or *Q. ilex* woods on siliceous soil, pileus 40-100 mm broad, scurfy and cracked like in *R. anatina*, hyphal ends thicker, about 6-12 µm wide ..... ***R. monspeliensis*** var. ***sejuncta***
9c Found under deciduous oaks, rarely *Tilia*, *Fagus*, *Betula*, pileus more or less scurfy and cracked, grey to blackish green (smoother and lilac in fo. *subvesca*), $FeSO_4$ slowly greenish grey, spores smaller, with isolated warts, hyphal ends 5-10 µm wide ..... ***R. anatina***
10a Spores 5,2-7 × 4,7-5,7 µm, with an ornamentation of short ridges, basidia 6,5-9 µm wide, lamellae sometimes forked and decurrent, pileus more or less violet, bluish, greenish, often very pale ..... ***R. subterfurcata***
10b Spores and basidia larger **11**

11a Pileus colours very pale on an ochraceous ivory background, context pink with $FeSO_4$ (cf. *R. galochroides* with narrower hyphal ends) **13**

11b Pileus olive green, rarely slightly bluish **12**

12a $FeSO_4$ pink, pileus green (bluish in fo. *caerulea* ad inter.), spores subreticulate, hyphal ends having the lower cells mostly subisodiametric and the apical ones often elongate, found under deciduous trees, mainly under *Quercus* on calcareous soil ..... ***R. pseudoaeruginea***

12b Found under birches, pileus olive to dark bluish green, taste mild, context not turning pink with $FeSO_4$, sporal ornamentation having thin more or less branched ridges, hyphal ends huge but not distinctive (lower cells are not so different from the apical ones ..... ***R. atroglauca***

13a Pileus 30-6 mm broad, with a pale tinge of lilac or greenish-grey on a whitish background, spores with prominent almost isolated warts, hyphal ends consisting of subisodiametric cells, found under birches, oaks, etc ..... ***R. galochroa***

13b Pileus 40-100 (120) mm broad, very pale, with ochre to hazel grey or rarely olive grey patches, sporal ridges sometimes fusing into a partial network, found under *Fagus* (cf. *R. subterfurcata*) ..... ***R. faustiana***

13c Pileus ivory cream or with a shade of greyish green (the remaining charachters like in 12a) ..... ***R. pseudoaeruginea*** fo. ***galochroa***

14a Context lilac under the cuticle and in nibbled parts, possibly also along the distal edge of lamellae in wet weather, stipe mostly with lilac shades (also green in fo. *pictipes*), pileus violet, bluish, or partially green, $FeSO_4$ bright orange, spore print IIc ..... ***R. grisea***

14b $FeSO_4$ reaction not distinctive (pale orange pink) **15**

15a Spores having isolated warts, spore print ochre (IIIa-b), hyphal ends 3-4-5 µm wide, taste mostly entirely mild ..... ***R. medullata***

15b Sporal ornamentation with ridges forming a partial network, spore print IIa-IIb **16**

16a Pileus ivory cream with a shade of grey or greenish, fruit bodies small, found in *Quercus ilex* undergrowth with *Erica arborea* ..... ***R. galochroides***

16b Fruit bodies medium-sized, pileus dark green to blackish blue, partially violaceous, widespread in deciduous or coniferous woods ..... ***R. parazurea***

Subsez. ILICINAE (Romagnesi 1985, *Russ. Eur.*, Suppl.: 1029) Buyck 1990, Bull. Jard. Bot. Nat. Belg., 60 (1/2): 198.

Diagnosi originale

Structura cutis similis R. cyanoxanthae, *pilis velleris tenuissimis, sed dermatocystidiis magis manifestis atque amplioribus. Carne ope $FeSO_4$ parum colorata, non cinerascente. Sporis cremeis, verrucis humilibus, saepe inter se connexis. - Typus:* R. ilicis *Romagn. - Chev. - Privat.*

Typus (originale): *R. ilicis* Romagnesi, Chevassut & Privat

Colorazioni del cappello sovente pallide, lamelle non troppo fragili, sporata da crema a giallina, peli sottili, dermatocistidi cilindracei, lunghi e stretti, ife debolmente metacromatiche con il Blu di Cresile. Reazione (almeno nelle forme più tipiche) debole al $FeSO_4$ e nulla all'Anilina. L'annessione di *R. werneri* (Sarnari 1986) comporta un emendamento del gruppo riguardo al colore sporale, con estensione alla gamma del giallo chiaro.

KEY to the SPECIES of Subsect. ILICINAE

1a Pileus dark olive to dark purple brown resembling *R. sororia*, spores small, about 6-7 × 4,5-5,5 µm, spore print IIb-c ..... ***R. helgae***

1b Not with the above combination of characters, pileus sometimes very pale, with *Heterophyllidia*-like colours 2

2a Found under evergreen oaks, fruit bodies fleshy and mostly sturdy, very pale-coloured, context hardly reacting with $FeSO_4$, hyphal ends cylindric, with few septa, 2-3 (4) µm wide, spores at least with a partial network 3

2b Pileus distinctly green (but pale or whitish variants are likely to be met with), context turning pink with $FeSO_4$, hyphal ends cylindric, not wider than 4-5 (6) µm, spore print IIb-c (if spore print IIIa-b, cf. stenotrichoid forms of *R. medullata*) 4

3a Spore print IIIc-IVa, sporal ornamentation consisting of a very thin network hardly visible under O. M., found in sunny sites with siliceous soil under *Quercus suber* ..... ***R. werneri***

3b Spore print about IId, sporal network ornamentation easily visible under O.M., fruit bodies sturdy and fleshy, found under *Quercus ilex*, very rarely under *Q. pubescens* ..... ***R. ilicis***

4a Dermatocystidia cylindric, 4-7 µm wide, mostly capitate, spores oblong, showing thin ridges, found under birch or conifers. . . . . ***R. aeruginea***

4b Dermatocistidia clavate, hardly capitate, 6-9 µm wide, sporal ornamentation at least locally consisting of a partial reticulum (cf. green forms of *R. grisea*) ..... ***R. stenotricha***

Sezione VIRESCENTINAE (Singer) Sarnari

[Singer 1932, Beih. Bot. Centralb., 49 (2): 241] Sarnari, stat. nov.

Diagnosi originale

Rand gerundet. Hut schuppig-aufbrechend, Epicutis ohne Cystiden, mit pseudo-parenchymatischen Zellen, die oft in Haare verlängert sind - wenigstens bei R. virescens. *Hut weiβ, gelblich, graulich, fleischfarben oder - gewöhnlich - grün. Mild oder leicht scharf. Sporenstaub I, I-II (?II). Hymenialcystiden - bei* R. virescens *kaum blauend mit Sulfovanillin.*

Typus (automatico): *R. virescens* (Schaeffer) Fries

CARATTERI GENERALI

Superficie del cappello forforacea, presto frammentata in areole, sapore dolce, peli dell'epicutis nascenti da uno strato di aspetto pseudoparenchimatico (elementi sferocistoidi). Dermatocistidi presenti nella sola corteccia del gambo (ma qualche specie esotica parrebbe averne di sottili anche nel cappello). Oltre una mezza dozzina di specie distribuite nei diversi continenti.

Sezione GRISEOFLACCIDAE ad interim

("*Griseoflaccidinae* ad int. " in Sarnari, 1993)

CARATTERI GENERALI

Portamento e consistenza di *Tenellae*, sporata crema, caratteri microscopici come nelle *Griseinae*. Pigmento granulare da verificare sul fresco.

SOTTOGENERE AMOENULA

Sarnari, subgen. nov.

Diagnosi

Sapore dulci, coloribus variabilibus, e rubro purpureo violaceo, viridi, partim brunneo, vel flavo, tegimento velutino, cum pilis subulatis, dermatocystidiis ac laticiferis ubique absentibus, cystidiis in hymenio vacuis, in SBA inertibus. Pigmento vacuolari rubro. - Typus: R. amoena Quélet.

Typus: *R. amoena* Quélet.

CARATTERI GENERALI

Cappello vellutato, da rosso porpora a violetto, talvolta in parte brunastro o olivastro, anche interamente giallo, gambo vellutato, più o meno tinteggiato di rosso, sapore dolce, odori non gradevoli, come di crostacei cotti o di *Lactarius volemus* (almeno nelle specie d'Europa), sporata crema o ocra. Spore prive di tacca amiloide. Basidi più larghi che in *Heterophyllidia*, circa 8-13 (14) µm. Peli cistidiformi otticamente trasparenti ed inerti in SBA sulle facce delle lamelle (in luogo degli abituali pleurocistidi). Epicutis di peli subulati (a forma di lesina), la cui base consta di articoli corti catenulati. Dermatocistidi assenti sul cappello e sul gambo. Ife reagenti ortocromaticamente con il Blu di Cresile. Pigmento vacuolare rosso.

KEY to the SPECIES of Subgenus AMOENULA

1a Empty pleurocystidia present and very conspicuous, about 10-20 µm wide, context turning light brown with Phenol **2**

1b Empty pleurocystidia none, lower cells of hyphal ends globose, context turning violet with Phenol ..... ***R. amoena* var. *acystidiata***

1c Empty pleurocystidia not wider than 10 µm **3**

2a Spore print light cream (IIa-IIb), lower cells of hyphal ends mostly globose, pileus initially flattened, purplish violet, possibly with green, yellow or brown patches, stipe usually carmine, found in fresh deciduous or coniferous woods ..... ***R. violeipes***
- Pileus lemon yellow, stipe whitish, other characters like in the preceding one (fo. *violeipes*) ..... ***R. violeipes* fo. *citrina***

2b Spore print dark cream (IIc) IId, lower cells of hyphal ends rarely globose, up to 8 (10) µm wide, mostly under thermophilous or evergreen trees (*Quercus*, etc.), pileus purple, sometimes green or brown, or variegated (fo. *amoenicolor*), wholly green (fo. *olivacea*), dark purple with blackish center (fo. *nigrosanguinea*, nom. inval.) ..... ***R. amoenicolor***

3a Context turning violet with Phenol, lower cells of hyphal ends not wider than 11 (14) µm, pileus 20-50 (60) mm, violaceus purple (fo. *amoena*), olive green (fo. *viridis*), etc. ..... ***R. amoena***

3b Context turning brownish with Phenol, lower cells of hyphal ends globose, 12-18-24 µm wide, spore print IId to IIIa, pileus 40-120 mm broad ..... ***R. amoenicolor* var. *stenocystidiata***

SOTTOGENERE INGRATULA

Romagnesi

Romagnesi 1987, Doc. Myc., 69: 39

Diagnosi originale

*Sapore plerumque acerrimo vel nauseoso, raro dulci (*R. livescens *ss. Bres.). Odore frequenter ingrato. Margine pilei alte sulcato atque gelato in stirpe* foetente *et* pectinata. *Sporis albis vel cremeis. Dermatocystidiis semper praesentibus (sed interdum parum distinctis sine ope S. A. vel S. B. A). Stipite valde cavernoso; coloribus ochraceis vel umbrinis (nisi in formis albinicis). - Typus:* R. foetens *(Pers. : Fr.) Fr.*

Typus (originale): *R. foetens* (Pers. : Fr.) Fr.

CARATTERI GENERALI

Cappello da ocra a bruno rossastro a grigio fuliggine (mai verde o violetto), con il margine assottigliato o acuto, scanalato per lungo tratto nelle forme più tipiche, cuticola spessa ed elastica, gelificata, gambo presto cavernoso, a corteccia rigida. Odori in generale forti, nauseanti o anche gradevoli, come di carne bruciacchiata, di ipocloriti, di sperma, di anice, di mandorle amare, etc.; sapore mite o pepato. Sporata crema, raramente bianca. Spore non sempre prive di tacca amiloide. Dermatocistidi generalmente inerti ai reattivi solfoaldeidici. - Comprende due distinte sezioni con velo, una delle quali (*Fistulosae*) extraeuropea.

Sez. INGRATAE (Quélet) Maire
- subsez. ***Farinipedes*** Singer
- subsez. ***Foetentinae*** (Melzer & Zvara) Singer
  - serie *Foetens* ad int. (*Foetentinae* ss. str. Bon)
  - serie *Pectinata* ad int. (*Pectinatae* Bon)

Sez. SUBVELATAE Singer

Sez. FISTULOSAE (Heim ex Sing.) Buyck (extraeuropee)

Sez. FELLEINAE (Melzer & Zvara) Sarnari, emend. (transizione verso *Russula*)

Sezione INGRATAE (Quél.) R. Maire

(Quélet 1888, *Fl. Myc. Fr.*: 345) R. Maire 1910, Bull. Soc. Myc. Fr., 26: 120

Diagnosi originale

Cuticule du peridium paille, ocracée, bistre ou olive. Odeur désagréable, saveur âcre.

Typus: *R. foetens* Persoon : Fr. (designato da Singer 1951, *Agaricales*, Ed. I: 705)

CARATTERI GENERALI

Velo assente. Pigmento di tipo membranario. Margine pileico acuto o subacuto, lamelle più o meno falciformi, stillanti talvolta gocce acquose. Tacca sporale generalmente inamiloide.

Subsez. FARINIPEDES Singer 1986, Agar. Mod. Tax., Ed. 4: 817.

Diagnosi originale
Sporis in cumulo albis; pigmentis flavidis vel brunneolis hyphas pilei haud incrustantibus; dermatopseudocystidiis in sulfovanillina caerulescentibus; pileo glabro vel subfurfuraceo aut rimuloso. - Typus: R. farinipes *Rom. ex Britz.*

Typus (originale): *R. farinipes* Romell

Cappello da ocraceo a citrino, non apprezzabilmente arrossante. Spore bianco puro in massa, prive di tacca amiloide. Grossi dermatocistidi più o meno fusiformi nell'epicutis.

Subsez. FOETENTINAE [Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 98] Singer 1932, Beih. Bot. Centralbl., 49 (2): 239.

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Pileo attenuato, margine membranaceo, primum involuto, aetate rugoso-striato; cute coloribus numquam rubris, caeruleis, vel viridibus, lubricata, e udo glutinosa, solum in R. subfoetente *cystidiata. Lamellis angustis, tenuibus, adnatis, irroratis. Sporis in cumulo cremeis, solum in* R. subfoetente *albis.*

Typus (automatico): *R. foetens* Persoon : Fr.

Sporata crema. Statura media, talvolta decisamente grande o anche medio-piccola, con un cappello ocra, poi macchiato di bruno rossastro (serie *Foetens*); oppure taglia medio-piccola e colori da bruno d'ombra a grigiastro fuligginoso, a grigio brunastro (serie *Pectinata*). Dermatocistidi mai voluminosi, ed anzi decisamente piccoli e conici nella serie *Pectinata*. Tacca sporale debolmente amiloide.

Sezione SUBVELATAE Singer

Singer 1932, Beih. Bot. Centralbl., 49 (2): 243-244

Diagnosi originale
Hutepidermis mit graubräunlichem oder doch nicht lebhaftem Pigment, mit mäßiger Menge quellbarer Substanz, ziemlich deutlich in Epicutis und Hypoderm geschichtet, kahl, jedoch mit meist gelben Flöckchen oder Schüppchen, die entweder nur den Hutrand oder Hut und Stiel wie Velumrelikte bekleiden. Fleisch unveränderlich weiß. Rand scharf. Sporenstaub I. Mild. Die Breite dieser Sektion läßt sich noch nicht hinreichend überblicken.

Typus (automatico): *R. subvelata* Singer

CARATTERI GENERALI

Differiscono dalle *Foetentinae* per un velo giallastro aracneiforme che lascia residui alla base del gambo e sul margine pileico. Questo velo, formato da ife incrostate di un pigmento giallo epimembranario, manifesta la proprietà di arrossare a contatto con le basi forti (KOH 20%).

Sezione FELLEINAE (Melzer & Zvara) Sarnari

[Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 103] Sarnari, stat. nov., emend.

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Pileo attenuato, in margine membranaceo; cute cum pigmento flavo vel viridi, cystidiis ciliatis praedita, lamellis irroratis; carne fragili-compacta. Sporis in cumulo e albis cremeis.

Typus (automatico): *R. fellea* (Fries : Fr.) Fries.

CARATTERI GENERALI

Colori fondamentalmente ocra, sporata bianca. Dermatocistidi alquanto voluminosi e ben caratterizzati, spore corredate di tacca amiloide. - Gruppo di transizione verso il subgenere *Russula*, comprendente, accanto alla ben nota specie tipo europea, una *R. simillima* Peck del nord America.

KEY to the SPECIES of Subgenus INGRATULA

1a Remnants of a yellowish veil at stipe base turning immediately red with KOH, basal mycelium yellow, taste mild (sect. *SUBVELATAE*) ..... ***R. insignis***

1b Yellow veil lacking, KOH not turning the stipe base red **2**

2a Spore print pure white, large dermatocystidia in epicutis, odour pleasant of fruit or *Pelargonium* **3**

2b Spore print cream, exceptionally ochre (?), dermatocystidia small to medium-sized (subsect. *FOETENTINAE*) **5**

3a Both pileal margin and lamellar distal end obtuse, pileus honey-ochre to tawny-ochre, stipe slowly becoming concolorous, spores having an amyloid spot, dermatocystidia cylindrical well characterized, pigment incrusting (sect. *FELLEINAE*) ..... ***R. fellea***

3b Pileal margin acute, strongly tuberculate-striate, dermatocystidia mostly large and spindle-shaped, spores lacking an amyloid spot (subsect. *FARINIPEDES*) **4**

4a Found in deciduous woods, context subelastic, pileus ochre-yellow somewhat uniform, spores 6,4-8 × 5,8-6,7 µm, with thin scattered spines, odour fruity, Gayac hardly reacting on context ..... ***R. farinipes***

4b Very rare northern species found in coniferous woods, pileus sometimes showing a flattened umbo, spores subglobose, 7,2-9 × 6,4-7,4 µm, ornamentation consisting of low warts and some ridges ..... ***R. pallescens***

5a Pileus tawny-ochre, lamellae often weeping, odours generally strong (series *Foetens*) **6**

5b Small to exceptionally medium-sized fruit bodies, pileus brownish ochre to smoky-brown, to ashy-grey, pileus margin strongly tuberculate-striate, dermatocystidia tiny and lanceolate (series *Pectinata*) **11**

6a Scent of bitter almond, anise, or marzipan, spores somewhat globose (subseries *Laurocerasi*) **7**

6b Odour unpleasant, sweetish-oily or hypochlorite-like, occasionally also fruity (subseries *Foetens*) **8**

7a Odour anise-like strong and persistent, lasting a few weeks in dried specimens, pileus margin smooth or shortly striate ..... ***R. fragrantissima***

7b Edge of lamellae and stipe with blackish brown dots, pileus glutinous in young fruit bodies, odour a mixture of bitter almonds and *R. foetens*, taste of context acrid in stipe ... ***R. illota***

7c Edge of lamellae and stipe lacking dark dots, pileus never glutinous, scent purer of bitter almonds, taste mild in the stipe, sporal ornamentation consisting of huge winged ridges .. .. ***R. laurocerasi***

8a Context never with lemon yellow shades when cut, not turning yellow with KOH, spores mostly large and often globose (stirps *Foetens*) **9**

8b Context slowly turning lemon yellow when cut, at least in young fruit bodies, often turning yellow with KOH **10**

9a Big-sized fruit bodies, pileus glutinous when young and in wet weather, margin acute, soon strongly tuberculate-sulcate, odour unpleasant, taste very acrid, spores with projecting somewhat isolated spines ..... ***R. foetens***

9b Medium-sized fruit bodies, pileus lacking gluten, spores 7,5-9,8 × 6,5-8,4 µm, ornamentation with ridges forming a partial network, growing mostly in coastal pinewoods with *Cistus* in the Mediterranean zone ..... ***R. putida***

10a Spores oblong, 7,2-9,6 × 6-7,2 µm, with low somewhat scattered warts, context turning yellow with KOH ..... ***R. subfoetens***

10b Spores like in *R. subfoetens*, context inconstantly yellowing with KOH, smell of fresh butter in young specimen, then unpleasant, found under *Pinus* or *Quercus* (probably the same as the former 10a) ..... ***R. josserandii***

10c Spores subglobose not longer than 8,5 µm, with spines partially joined by ridges, context not yellowing with KOH, found in Mediterranean area, mostly under *Quercus* ..... ***R. inamoena***

11a Odour of *Pelargonium*, spore print ochre (IIIa-b) ..... cf. ***R. foeda***

11b Odour different, spore print cream **12**

12a Taste acrid **13**

12b Taste mild or sometimes bitterish, odour unpleasant, rubbery or only fishy **14**

13a Fruit bodies thickset, pileus ochre like in *R. farinipes*, sometimes with smoky-brown o rusty-brown spots, occasionally with purplish red stains at stipe base, odour like in *R. foetens* ..... ***R. pectinata***

13b Fruit bodies mostly medium-sized, pileus dark smoky-brown to ashy-grey, sometimes spotted rusty-brown, odour spermatic, context usually faintly turning blue with Gayac, spores sometimes subglobose ..... ***R. sororia***

13c Small-sized fruit bodies, pileus dark like in the preceding species, odour like in *Lactarius volemus*, then subspermatic, spores elongate, context turning blue with Gayac ..... ***R. amoenolens***

14a Widespread under *Quercus* or coniferous-trees in mediterranean area, taste unpleasant and sometimes bitterish, odour rubbery or fishy, pileus mostly ochre-brown, rusty-brown spotted as the remaining parts of the fruit body, often with purplish red spots at the stipe base near the basal mycelium, sporal ornamentation showing a partial reticulum (if the sporae have warts isolated or faintly crestate, cf. *R. pectinatoides* ss. Romagn., non Peck) ..... ***R. praetervisa***

14b Taste not unpleasant, odour faintly fishy, then strong of salted anchovy or of stockfish on drying, pileus grey to grey-brown, rusty-brown spots rare, tardy and faint, base of stipe lacking purplish red stains, spores reticulate like in *R. violeipes*, found in gardens or parks under *Quercus ilex* ..... ***R. hortensis***

SOTTOGENERE RUSSULA, emend.

CARATTERI GENERALI

Questo vasto raggruppamento comprende ciò che resta del genere *Russula* una volta escluse *Compactae*, *Heterophyllidia*, *Ingratula*, *Amoenula*, oltre alle *Incrustatula* che seguono. Si tratta di forme molto variabili per la statura, la consistenza, il grado di acredine eventuale, i colori, da rosso a rosso-arancio, a violetto, in parte o anche interamente verde, giallo, bruno, il pigmento per lo più vacuolare (capita che un fine pigmento in grani rosso-violacei contorni questi vacuoli). Le spore hanno una tacca amiloide. I dermatocistidi non mancano nella corteccia del gambo e nel rivestimento del cappello, con l'unica eccezione delle *Auratinae*, caratterizzate da epicutis omogenea. Si tratta di dermatocistidi da unicellulari a multisettati, nudi o ricoperti di incrostazioni acido-resistenti, raramente accompagnati da ife primordiali. Non senza perplessità, consideriamo in quest'ambito le nostre *Messapicae*, gruppo monospecifico, giustificato principalmente dal velo.

Sez. RUSSULA, emend.
- subsez. ***Russula***, emend.
- subsez. ***Consobrinae*** Sarnari
- subsez. ***Sardoninae*** Singer, emend. (*Firmae* Fr. p.p.)
- subsez. ***Violaceinae*** (Romagnesi) Sarnari
- subsez. ***Urentes*** Maire, emend.
- subsez. ***Rubrinae*** (Melzer & Zvara) Singer, emend.

Sez. VISCIDINAE (Sarnari) Sarnari

Sez. POLYCHROMAE Maire, emend. (subgen. *Polychromidia* Romagn. p.p.)
- subsez. ***Xerampelinae*** Singer
- subsez. ***Melliolentinae*** Singer, emend.
- subsez. ***Integriforminae*** Bon, emend.
- subsez. ***Paraintegrinae*** Sarnari
- subsez. ***Auratinae*** Bon

Sez. PARAINCRUSTATAE Sarnari
- subsez. ***Integrae*** Maire, emend.
- subsez. ***Lepidinae*** (Melzer & Zvara) Singer

Sez. TENELLAE Quélet (subgen. *Tenellula* Romagn.)
- subsez. ***Puellarinae*** Singer
- subsez. ***Rhodellinae*** (Romagn.) Bon
- subsez. ***Laricinae*** (Romagn.) Bon, emend.
- subsez. ***Betulinae*** (Romagn.) Sarnari (*Sphagnophilae* Singer)

Sez. MESSAPICAE Sarnari (o subgen. ? verso *Macowanites*)

Sezione RUSSULA, emend.

CARATTERI GENERALI

Comprende forme prive di velo, dal sapore pepato (non esclusa l'eventualità di forme accidentalmente dolci), la sporata da bianco puro a giallo carico. Epicutis a dermatocistidi ben caratterizzati, unicellulari o plurisettati, di regola nudi, eventualmente incrostati in poche specie a sporata ocra o gialla (da noi comprese nella subsez. *Rubrinae*).

subsez. ***Russula***
- serie *Atropurpurea* ad int.
  - stirpe *Atropurpurea* ad int. (*Atropurpurinae* Romagn.)
  - stirpe *Citrina* ad int. (*Citrinae* Romagn.)
- serie *Russula* ad int. (*Emeticinae* Melzer & Zvara ss. Romagn.)
  - stirpe *Russula* (*Emetica*) ad int.
  - stirpe *Mairei* ad int.

subsez. ***Consobrinae*** Sarnari

subsez. ***Sardoninae*** Singer, emend. (*Firmae* Fries p.p.)
- serie *Sardonia* ad int.
- serie *Sanguinea* ad int.
- serie *Exalbicans* ad int. (*Exalbicantinae* Singer)
- serie *Persicina* ad int. (*Persicinae* Romagn.)

subsez. ***Violaceinae*** (Romagnesi) Sarnari

subsez. ***Urentes*** Maire
- serie *Badia* ad int.
- serie *Decipiens* ad int.
- serie *Maculata* ad int.
- serie *Lundellii* ad int.
- serie *Cuprea* ad int.
- serie *Adulterina* ad int.
- serie *Veternosa* ad int.

subsez. ***Rubrinae*** (Melzer & Zvara) Singer, emend.

Subsez. ***RUSSULA***, emend.

Comprende forme della sez. *Russula* a sporata bianca, eccezionalmente crema, con dermatocistidi ben caratterizzati, unicellulari o plurisettati, sempre privi di incrostazioni. Il gambo non presenta tracce di pigmento rosso nelle condizioni ordinarie e le lamelle non stillano gocce acquose, né manifestano, in generale, la tendenza a decorrere sul gambo. La carne, nettamente ingrigente in molte specie, può rivelarsi poco cangiante o un po' ingiallente in altre. L'odore è il più delle volte sensibile, di cocco, di acetato di amile, in ogni caso mai di pelargonio come nelle *Violaceinae*.

KEY of Series ATROPURPUREA

1a Pileus red, sometimes pinkish, rarely with a shade of carmine, possibly faded, spore print white (cf. series *Russula*)

1b Pileus purple, violet, partially or entirely yellow, green, brown, very rarely red (due to pigmental dissociation), spore print white or cream (series *Atropurpurea*) **2**

2a Pileus purple to violet, possibly yellow or green at disc, sometimes blackish, exceptionally brownish, spore print usually white (stirp *Atropurpurea*) ..... **A**

2b Pileus yellow, yellow green, rarely with orange patches, spore print white or cream (cf. also yellow or green forms of stirp *Atropurpurea*) (stirp *Citrina*) ..... **B**

A - Stirp ATROPURPUREA

1a Species mostly found under alpine dwarf shrubs, at times associated with *Salix* in the riparial vegetation of northern Europe **2**

1b Found in mountain shrubberies of *Alnobetula viridis*, as far as the lowlands associated with *Alnus glutinosa* or *incana* ("*R. pumila*"), stipe becoming grey or grey brown, sometimes at the beginning yellow all over, pileus 20-40 (50) mm, taste mild or slightly acrid ..... ***R. alnetorum***

1c Found in woods, or in association with other mycorrhizal hosts **3**

2a Spores 7-9 × 5,6-7,2 µm, ornamentation consisting of thin lines forming a reticulum, dermatocystidia 6-9 µm wide, 0-1 septate, context slowly turning blue with Gayac, odour like coconut or fruit .... ***R. laccata***

2b Odour like amyl acetate (*R. fragilis*), context mostly hardly turning blue with Gayac [species not confirmed, looking like the former (2a) in the remaining characters] ..... ***R. alpigenes***

3a Pileus 50-120 mm broad, variously coloured, context compact, strongly greying when wet, spores 7-9 × 5,7-7,2 µm ..... ***R. atropurpurea***

3b Found under birch, rarely *Picea*, context fragile, pileus light pink to partially violaceous, mostly fading to white, taste very acrid, spores large, ornamentation consisting of spines and thin lines forming an incomplete network, edge of lamellae sometimes serrate ..... ***R. betularum***

3c Not with the above combination of characters **4**

4a Taste usually markedly acrid, odour like amyl acetate **5**

4b Taste faintly or moderately acrid, sometimes mild **6**

5a Spores subglobose, comparatively large, reticulate, edge of lamellae often serrulate, context not turning blue with Gayac, widespread on dry soil under deciduous or coniferous trees. ..... ***R. fragilis***

5b Spores small, oblong, commonly found in damp coniferous woods of the subalpine zone, as far up as northern Europe, context turning blue with Gayac ..... ***R. atrorubens***

6a Found in dry deciduous woods **7**

6b Found in moist coniferous forests with sphagnum, pileus carmine red, often with a shade of brown, context very fragile and watery, stipe apically constricted ..... ***R. aquosa***

7a Found under *Quercus*, mainly evergreen oaks, context faintly acrid, spores 6,6-8,8 × (5,2) 5,5-7 µm, ornamentation crestate-reticulate, pileus purple to violet, to green, etc., very variable in colours (wholly yellow in fo. *heliochroma*) ..... ***R. poikilochroa***

7b Pileus bright red like in *R. minutula*, spores 6,7-7 × 6-6,2 µm, basidia and cystidia not wider than 10 µm ..... ***R. rubrocarminea***

KEY of Series ATROPURPUREA

1a Pileus red, sometimes pinkish, rarely with a shade of carmine, possibly faded, spore print white (cf. series *Russula*)

1b Pileus purple, violet, partially or entirely yellow, green, brown, very rarely red (due to pigmental dissociation), spore print white or cream (series *Atropurpurea*) **2**

2a Pileus purple to violet, possibly yellow or green at disc, sometimes blackish, exceptionally brownish, spore print usually white (stirp *Atropurpurea*) ..... **A**

2b Pileus yellow, yellow green, rarely with orange patches, spore print white or cream (cf. also yellow or green forms of stirp *Atropurpurea*) (stirp *Citrina*) ..... **B**

B - Stirp CITRINA

1a Spore print cream to light ochre, between IIa-IIIa (cf. yellow or green forms of subsect. *Sardoninae*) **2**

1b Spore print pure white (cfr. yellow or green forms of stirp *Atropurpurea*, especially *R. atropurpurea* fo. *dissidens*, *R. fragilis* var. *gilva*, *R. poikilochroa* fo. *heliochroma*) **3**

2a Only found under *Fagus*, pileus small and fragile, chrome yellow or with a tawny orange patch at the disc, sometimes wholly of this colour, spore print IIc (IIIa) sporal ornamentation aculeate ..... ***R. solaris***

2b Species mostly boreal associated with broadleafed (especially *Betula*) or coniferous trees, but also in snowbeds among *Salix herbacea*, *S. glauca* or *Betula glandulosa*, pileus green yellow to orange red, spore print IIa-b, context moderately greying, sporal ornamentation of thin lines forming a network ..... ***R. citrinochlora***

3a Pileus light lemon yellow (also green, according to some Authors), usually whitish near the margin, sometimes fading to white all over, rarely light green, spores finely reticulate, found in deciduous or coniferous woods ..... ***R. raoultii***

3b Found on sphagnum, context turning strongly grey, spores wider than in the preceding species, hyphal ends cylindric ..... ***R. pseudoraoultii***

3c Pileus yellow, possibly with a tawny shade at disc, stipe surface and nibbled parts changing to rusty brown, spores 6,7-8,2 × 5,2-6,7 µm, warty with a partial network of thin lines ..... ***R. citrina***

KEY of Subsect. RUSSULA - Series RUSSULA

1a Spores large, sporal ornamentation aculeate, spines high and at least partly connected by thin lines so as to form a partial network, context hardly turning blue with Gayac (stirp *Emetica*) **2**

1b Sporal ornamentation finely warty, often densely reticulate, context sometimes turning blue with Gayac (stirp *Mairei*) **3**

1c Found under deciduous trees, context rigid, often staining chrome yellow in broken parts, lamellae mostly decurrent, very distant in typical forms, dewy in wet wether (in subsect. *Sardoninae*) ..... ***R. luteotacta***

2a Found in moist sites under *Betula*, exceptionally under *Picea*, fruit bodies small and fragile, pileus pinkish to partially violaceous, fading, sometimes entirely white (in series *Atropurpurea*) ..... ***R. betularum***

2b Pileus up to 100 (120) mm, spores about 8,8-10,5 × 7,4-8,8 µm, found in peat-bogs especially under coniferous trees ..... ***R. emetica***

2c Pileus non larger than 60 mm, spores 7,2-9,8 × 6,2-7,8 µm, found in deciduous or coniferous woods on sandy soils, usually muscicolous (*Leucobryum* or *Polytrichum*) ..... ***R. silvestris***

3a Found along paths in thermophilous oak woods, mostly on clayey soils, pileus bright red to pinkish, sometimes with a tinge of carmine, context becoming slowly dirty grey due to dehydration, also blackening on handling, odour of amyl acetate like in *R. fragilis*, spores 7,4-9,5 × (6) 6,4-7,8 µm ..... ***R. rhodomelanea***

3b Found under broadleafed trees, context never greying or blackening, smelling like in *R. fragilis*, lamellae purely white, spores 7-8,2 × 6-7 µm ..... ***R. emeticella***

3c Not with the above combination of characters **4**

4a Found under deciduous trees, mostly *Fagus*, context unchanging or tardily slightly yellowing, smelling like in *R. emetica*, lamellae crowded, white, often with a more or less distinct bluish shade in young fruit bodies ..... ***R. mairei***

4b Context turning grey when wet, lamellae without a blue shade **5**

5a Tiny alpine species, also found in mixed woods of northern lowlands, lamellae distant, spores subglobose, with a very thin ornamentation, dermatocystidia mostly cylindric, hyphal ends larger than in the following species ..... ***R. nana***

5b Found on *Sphagnum*, but also in comparatively dry sites under deciduous and coniferous trees, lamellae often subdecurrent, sporal ornamentation higher than in *R. nana*, dermatocystidia more clavate ..... ***R. grisescens***

Subsez. CONSOBRINAE Sarnari, subsez. nov.

Diagnosi

Pileo carnoso, e griseo olivaceo brunneo, margine subacuta, nec striata, sporis in cumulo cremeis, carne acerrima, vix grisescenti vel paulum rubescenti. - Typus: *R. consobrina* (Fries : Fr.) Fries.

Typus: *R. consobrina* (Fries : Fr.) Fries.

Margine pileico liscio, cappello da bistro grigiastro a brunastro evocante nei colori certe *Foetentinae* della serie *Pectinata*, carne pepata, un po' arrossante con Formalina, per il resto poco sensibile ai reattivi chimici. Sporata crema. Grossi dermatocistidi nell'epicutis.

Une seule espèce : **Russula consobrina**

Subsez. VIOLACEINAE (Romagnesi 1962, Bull. Soc. Linn. Ly.: 172) Sarnari, stat. nov.

Diagnosi originale

Pileo atropurpureo, carmineo, violaceo, olivaceo vel viridi. Sapore acri. Odore sicut apud R. fellcam. *Sporis cremeis.* - *Typus:* R. violacea *Quél. ss. Romagn.*

Typus (originale): *R. violacea* Quélet

Odore di pelargonio poi, generalmente, di alici in salamoia alla corruzione, sporata crema pallido, carne più o meno nettamente ingrigente, talvolta anche un po' ingiallente.

KEY to the SPECIES of Subsect. VIOLACEINAE

1a Context turning more or less distinctly yellow **2**

1b Context turning grey **3**

2a Very rare species growing in deciduous woods (possibly absent in central Italy), context turning moderately yellow, spores aculeate (if the taste is mild cf. *R. terenopus*) ..... ***R. violacea***

2b Context turning strongly yellow, not turning blue with Gayac, lamellae initially sickle-shaped, reddening with ammonia, found under *Abies alba*, also *Picea* according to some Authors (in subsect. *Sardoninae*) ..... ***R. cavipes***

2c Context turning moderately yellow, not reddening with ammonia, dermatocystidia septate (species insufficiently confirmed, possibly a form of *R. cavipes*) ..... ***R. pseudocavipes***

3a Tiny species with pale grey-green pileus, odour faint, taste almost mild, spores large, aculeate, epicutis consisting of rather large dermatocystidia and hyphal ends ..... ***R. innocua***

3b Fruit bodies small and fragile, margin of the pileus sulcate, epicutis with hyphal ends thin, spores with sharper, higher spines than in the following species, usually forming a partial network ..... ***R. pelargonia***

3c Fruit bodies fleshy, almost medium-sized, margin of the pileus faintly sulcate, in tangential sections subcutis resembling a puzzle-like mosaic of ameboid hyphae, hyphal ends comparatively large, spores subglobose, lowly and at least partially reticulate, found under *Populus* or *Quercus* [a chain of intermediaries reunites this taxon with the former one (3b)] ..... ***R. clariana***

Subsez. SARDONINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 238, emend.

Diagnosi originale

Kleine Pilze vom "Fragilis-*Habitus*" *bis zu großen schönen Pilzen von spezifischer Gestalt. Geschmack stets scharf. Rand entweder anfangs stumpf, später mehr scharf oder (gewöhnlich) anfangs ± scharf und später oft ± stumpf. Sporenstaub II. Bau meist brüchig. Fleisch häufig leuchtend-gelb bei Luftexposition. Huthaut kahl oder oft mit abwischbarem Reif, wenn bei Trocken-heit gewachsen (bes* R. scrotina*), schmierig oder trocken, grün, violett, weiß, gelblich oder - letzteres in weitaus den meisten Fällen - vorwiegend irgendwie rot gefärbt, mit KOH meist braungelblich, stets mit Huthautcystiden, Hymenialcystiden in Sulfovanillin stets blau, meist appendikuliert und ziemlich lang. Mehrzahl der Arten europäisch, nur die Gruppe* "Palustres" *vorwiegend amerikanisch.*

Typus (qui designato): *R. chrysodacryon* Singer

(la tipificazione automatica non è applicabile nel caso specifico, essendo *R. sardonia* Fr. implicitamente esclusa dalla lista di Singer 1932, dove è rimpiazzata da *R. chrysodacryon*).

Carne più o meno rigida, lamelle adnate o di orientazione un po' decorrente nelle forme ben tipiche, stillanti gocce acquose in opportune condizioni, gambo generalmente pigmentato di rosa o di violacco, sporata fra crema ed ocra, bianca nella sola *R. luteotacta*. Sono simbionti di conifere (serie *Sardonia* ad int., serie *Sanguinea* ad int.), di betulle (serie *Exalbicans* ad int.), o di generiche latifoglie (serie *Persicina* ad int.).

KEY to the SPECIES of Subsect. SARDONINAE

A Pileus purple red to violaceous, sometimes partially yellow, green, brown, colours at times mixed or dissociated (some forms lacking red, blue, etc.), found under coniferous trees .. (**series *Sardonia***) **1**

B Also under conifers, but pileus pure red (cf. red forms of the preceding group) ..... (**series *Sanguinea***) **7**

C Found under birches, pileus usually polychromatic, stipe turning distinctly grey when wet ..... (**series *Exalbicans***) **8**

D Found under deciduous trees (including birches), pileus pure red, spore print white or cream ..... (**series *Persicina***) **10**

1a Medium-sized, hard-fleshed species, pileus purple red to brown red, context with a delayed burning taste, dry lamellae often smelling like cedar wood and spore print IIIc-IVa, Gayac turning context slightly blue (in subsect. *Urentes*) ..... ***R. badia***

1b Not with the above combination of characters **2**

2a Spores at least partly reticulate **3**

2b Spores verrucose or warts united by short ridges **6**

3a Lamellae sickle-shaped in young specimens, mostly turning rosy red with ammonia, pileus often umbonate **4**

3b Not with the above combination of characters **5**

4a Fruit bodies fleshy and compact, both lamellae and stipe subcortical layers often with a shade of lemon yellow (but fo. *pseudorhodopus* reportedly has white context not turning red with ammonia), Gayac mostly positive, found under *Pinus* on siliceous soil ..... ***R. sardonia***

4b Found under coniferous trees (*Abies alba*, rarely *Picea*), stipe becoming soon hollow, context fragile, turning distinctly yellow, not turning blue with Gayac, odour strong of *Pelargonium* ..... ***R. cavipes***

5a Stature often stockier than that of *R. sardonia*, context white, not turning red with Ammonia, taste moderately acrid, spore print IId (IIIa), found mostly under *Pinus* ..... ***R. torulosa***

5b Stature more or less slender, taste very acrid, spore print about IIIb, the remaining characters like in 5a (species confirmed but insufficiently characterized and often confused with the preceding one) ..... ***R. fuscorubra***

6a Found under *Picea* on calcareous soil, rarely with *Abies* or *Pinus*, fruit bodies more or less slender, taste very acrid, odour strong of fruit (like *R. fellea*), lamellae sometimes turning green ..... ***R. queletii***

6b Found under *Picea* on acid soil, pileus with darker colours, context thicker and very faintly smelling, taste less acrid, sporal ornamentation with short ridges (species poorly known, insufficiently characterized and confused with the preceding one) ..... ***R. fuscorubroides***

7a Found especially on *Sphagnum*, context turning distinctly grey, spores large, ornamentation consisting of a network of thin lines ..... ***R. helodes***

7b Found especially under *Pinus*, pileus cuticle soon dry and matt, lamellae mostly subdecurrent, spores with mostly isolated warts ..... ***R. sanguinea***

7c Pileus cuticle shiny to glazed, lamellae usually not decurrent, context almost unchangeable, spores subglobose, ornamentation consisting of a partial network ..... ***R. rhodopus***

8a Protean species, with spore print about IIIb, fruit bodies fleshy, medium to small-sized, pileus vinaceous pink or slightly greenish at disc, usually distinctly fading, context greying when moist, found on dry calcareous grounds ..... ***R. exalbicans***

8b Spore print cream, fruit bodies usually small-sized **9**

9a Fruit bodies slender and fragile, taste slightly acrid or completely mild, spore print pale cream about IIb (if darker cf. *R. queletii*), spores aculeate ..... ***R. gracillima***

9b Boreal species growing in wet places, sometimes with *Sphagnum*, fruit bodies slender, pileus a long time hemispheric, viscid and shiny, bright cherry red to copper red, to violaceous purple, possibly with yellow, orange or green patches, taste moderately acrid, sporal ornamentation consisting of small warts with some clusters or ridges ..... ***R. renidens***

9c Fruit bodies resembling a small *R. queletii*, but more thickset and fairly hard, pileus soon dry and matt, sporal ornamentation up to 0,6 (1) µm, (species insufficiently known) ..... ***R. pyrenaica***

10a Spore print white, context changing to chrome yellow in broken parts (but unchanging collections are not rare), lamellae more or less decurrent and very distant in typical forms, possibly weeping ..... ***R. luteotacta***

10b Spore print cream, lamellae moderately distant (includes several forms or varieties with doubtful taxonomic value) ..... ***R. persicina***

Subsez. URENTES R. Maire 1910, Bull. Soc. Myc. Fr., 26: 122, emend.

Diagnosi originale

Chair ne noircissant pas, nettement âcre.

Typus: *R. veternosa* Fries (designato da Bon 1986, Doc. Myc., 65: 53)

(la designazione di *R. urens* da parte di Singer 1951 (Agaricales, Ed. I: 719) risulta illegale, essendo questa specie creata posteriormente a Maire (Romell 1938) in presenza di altri nomi disponibili nel protologo dell'Autore francese).

Comprende forme della sez. *Russula* a sporata gialla, raramente ocra, con dermatocistidi sempre privi di incrostazioni, lamelle non decorrenti, non stillanti gocce acquose a umido, gambo raramente pigmentato di rosa-rosso.

KEY to the SPECIES of Subsect. URENTES

1a Found in coniferous forests, fruit bodies medium-sized, pileus purple red to brown red, context hard, having a delayed burning taste, lamellae smelling like cedar wood in dry weather, spore print IIIc-IVa, Gayac turning the context faintly blue ..... (**series *Badia*) *R. badia***

1b Not with the above combination of characters **2**

2a Context turning distinctly yellow brown, spore print IVc to IVd, spores mostly subglobose, large to occasionally huge, (8)-10-13 × (7)-9-11-12 µm, dermatocystidia aseptate or with few septa .... **series *Maculata***

2b Dermatocystidia aseptate, context almost unchanging or turning grey, never distinctly yellowing or browning **3**

2c Dermatocystidia multiseptate, smooth or diverticulate, spores with projecting isolated spines, rarely forming a reticulum **4**

3a Found under *Betula*, fruit bodies fleshy, at least medium-sized, pileus red, orange-red or partially yellow, lamellae crowded, spore print dark yellow, context almost unchanging, spores small, often rounded ..... **series *Lundellii***

3b Dermatocystidia clavate, non septate, spores small or medium-sized, partially reticulate, spore print IVc to IVe, context turning grey in typical forms, rarely slightly yellowing .... **series *Decipiens***

4a Epicutis hyphal ends diverticulate, dermatocystidia abundantly septate, diverticulate, spore print IVc to IVe, context almost unchanging, with negligible odour ..... **series *Cuprea***

4b Found in coniferous forests, spore print IVe, odour of fruit or *Pelargonium* like in *R. fellea*, dermatocystidia septate, not diverticulate, sporal ornamentation with mostly isolated spines ..... **series *Adulterina***

4c Found under deciduous trees, spore print yellow, (IVa) IVb to IVd, spores spinulose or aculeate, never exceeding 10 × 8 µm, dermatocystidia septate, usually not diverticulate, context smelling like gingerbread, honey, fruit, or otherwise inodorous ..... **series *Veternosa***

A - series MACULATA

1a Pileus red to orange, spores not exceeding 10,5 × 9 µm, found under deciduous trees, mostly oaks on calcareous soil ..... ***R. maculata***

1b Found in deciduous forests, pileus more variably coloured than in the preceding species (1a), pink to orange red, violet to copper brown, more or less fading, spores echinulate up to 12 (14) × 11 (12) µm ..... ***R. globispora***

1c Found in the alpine zone associated with *Dryas* and/or *Juniperus*, resembling *R. globispora*, but spores slightly smaller ..... ***R. dryadicola***

B - series LUNDELLII

1a Taste bitterish then slightly acrid, stipe never pink, dermatocystidia not diverticulate, spores subglobose ..... ***R. lundellii***

1b Taste distinctly acrid, never bitterish, stipe sometimes with a tinge of pink, spores never subglobose, dermatocystidia somewhat clavate or diverticulate, found only in central or northern countries of Europe ..... ***R. aurantioflammans***

C - series DECIPIENS

1a Spore print IVe, context greying, dermatocystidia clavate and very large, pileus prevalently red (reddish pink, vinaceous red, brownish pink, etc.), found often under oaks (*Quercus* ss.l.) ..... ***R. decipiens***

1b Context greying, but pileus basically yellow, microscopical charachters like in the preceding species (1a) ..... ***R. romagnesii***

1c With different characters (poorly known or not confirmed species) **2**

2a Spore print IVc, context staining dirty yellow, then slightly greying, stature and colours resembling those of *R. decipiens* ..... ***R. deceptiva***

2b With different characters, spore print IVc-d **3**

3a Fruit bodies small, variably coloured, context staining brownish grey, spores subglobose, 7-8,2 (9) × 6,5-7,5 µm, sporal ornamentation consisting of ridges forming a partial network, epicutis like in *R. decipiens* ..... ***R. cristata***

3b Stature like that of *R. cuprea*, context slightly yellowing, sporal ornamentation consisting of some ridges and thin lines ..... ***R. subcristulata***

D - series CUPREA

1a Tiny species growing under alpine dwarf shrubs, in mycorrhizal association with *Salix* (*S. herbacea*, *reticulata*, etc.), also found in European northern lowlands in association with *Salix* sp. or *Betula nana*, spore print about IVc, spores with clustered warts or partially reticulate ..... ***R. cupreola***

1b Found in woods **2**

2a Pileus bright red, rarely orange red, spore print IVd-e, spores with isolated or partially clustered warts, 8-10,4 (11) × 7,2-9 µm, found under *Quercus* (mostly *Q. ilex* or *pubescens*) in calcareous or steppe-like soil ..... ***R. juniperina***

2b Pileus multicoloured, spore print IVe, spores with projecting isolated spines **3**

2c Spore print IVb (IVc), sporal ornamentation consisting of a partial reticulum, pileus very variable in colours, found under *Quercus* ..... ***R. cupreoaffinis***

3a Spores 9-12 (13) × 8-10 (11) µm (with 4-spored basidia), stature and colours like those of *R. cuprea*, found under deciduous trees ..... ***R. gigasperma***

3b Spores not exceeding 10 (11) × 9 µm **4**

4a Pileus copper brown to violet purple, to green, yellow in fo. *junquillea* ad inter., usually under deciduous trees ..... ***R. cuprea***

4b Pileus very fragile, 50-120 mm broad, green to yellow green, often fading, margin strongly tuberculate-striated, found under *Abies* or *Picea*, rarely *Fagus* or *Carpinus* (cf. green forms of *R. cuprea*) ..... ***R. urens***

E - series ADULTERINA

1a Very like *R. integra*, pileus purple brown to dark purple, to olivaceous ochre, spore print IVe, stipe at last staining grey brown, spores 9-12 (14) × 8-11 (13) µm ..... ***R. adulterina***

1b Pileus mostly bluish violet to violaceous brown, spores 8-10,5 × 6,8-8,4 µm, aculeate or spines united by some ridges ..... ***R. firmula***

F - series VETERNOSA

1a Spore print IVa to IVb, context usually with a distinct odour **2**

1b Spore print IVd, odour none, context firm to tough, pileus vinaceous red to brownish purple or blackish purple, rarely with tawny orange or green yellow patches, spores 8-10 × 6,4-8 µm, found under *Fagus*, *Carpinus*, *Quercus* ..... ***R. vinosopurpurea***

2a Pileus pinkish to violaceous, more or less fading to ochre, odour like gingerbread or honey, spores echinulate, 6,4-8,5 × 5,8-6,8 µm, found in deciduous woods, usually *Fagus* ..... ***R. veternosa***

2b Pileus orange pink to copper red, sometimes with a purplish tinge, context moderately browning, spores about 8-10 µm, sporal ornamentation consisting of spines and short ridges, dermatocystidia thin, 3-6 µm wide, faintly septate, odour like in *R. lepida* ..... ***R. roseobrunnea***

Subsez. ***RUBRINAE*** (Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 111) Singer 1932, Beih. Bot. Centralbl., 49 (2): 242, emend.

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Pileo versus marginem paulatim attenuato, extremo membranaceo, cute cum cystidiis ciliatis, lamellis rotundatis, nec irroratis, liberis. Sporis in cumulo ab ochraceis vitellinis.

Typus: (automatico) *R. rubra* (Lamarck ex Fries : Fr.) Fries

Comprende le forme della sezione *Russula* a dermatocistidi incrostati. L'acredine risulta assai vivace, la reazione alla tintura di Guaiaco il più delle volte subnulla, la sporata ocra o gialla, l'habitat di latifoglie (almeno fino a prova contraria).

KEY to the SPECIES of Subsect. RUBRINAE

1a Spore print yellow (IVa to IVc), context not turning grey **2**
1b Spore print ochre, context turning grey, turning inconstantly blue with Gayac, smell of honey, pileus dull, slightly velutinous or pruinose, bright red to pink red ..... ***R. rubra***
2a Spore print IIIc-IVa, pileus basically orange, then fading, context slightly browning, odour none, sporal ornamentation consisting of thin partially clustered warts (very rare species insufficiently known, growing at the borders of boggy areas under deciduous trees) ..... ***R. blumiana***
2b Spore print about IVc, pileal colours possibly red, violaceous or brown **3**
3a Found under *Q. ilex*, pileus pale cigar brown to violaceous, context mostly hard, lamellae tardily smelling like cedar wood ..... ***R. quercilicis***
3b Pileus pure red to carmine or orange red, smell faintly fruity, sometimes indistinct, context not turning blue with gayac (except in fo. *oxydabilis*) ..... ***R. rutila***

Sezione VISCIDINAE (Sarnari) Sarnari

[Sarnari 1991, Mic. Veg. Medit., 6 (2): 128] Sarnari, stat. nov.

Diagnosi originale

Carpophoro firmo, pileo coloribus variabilibus, sapore acri, sporis fere reticulatis, in cumulo pallidis (I-II in Codice Romagnesii), velo granuloso inseparabili e flavo rubiginoso, cum KOH statim igneo rubello. In sectione Piperinarum *(Subgen.* Russula *ss. Romagn. 1967) locanda est. - Typus:* R. viscida *Kudrna.*

Typus (originale): *R. viscida* Kudrna

CARATTERI GENERALI

Specie robuste, con residui velari giallo ruggine presenti almeno alla base del gambo, dove una goccia di KOH sviluppa un vivace arrossamento, sapore assai moderatamente pepato, sporata bianca o crema pallido, dermatocistidi mal caratterizzati nell'epicutis.

Note - In conformità con l'opzione esercitata nel caso degli altri gruppi di specie con velo, le VISCIDINAE si trasformano in autonoma sezione esterna alla sez. *Russula*. Nonostante esse siano state proposte all'origine come gruppo affine alle *"Piperinae"* (con riferimento alla nomenclatura di Romagnesi 1967), a causa del sapore pepato, qualche argomento potrebbe deporre a favore della tesi contraria. Difatti, l'assenza di dermatocistidi ben caratterizzati nel rivestimento del cappello suggerisce una posizione a metà strada con le *Polychromae*, dove un'acredine di grado lieve o moderato è convenzionalmente tollerata. In ogni caso, con il nuovo modello sistematico qui proposto, tale problema è risolto dal rango di sezione assegnato alle *Viscidinae*.

KEY TO THE SPECIES OF SECTION *VISCIDINAE*

1a Medium/large-sized species with context thick and firm, becoming brown on exposure, pileus colourful, suviscid and shiny, purple red to violet or brownish green, sometimes yellow all over, spore print pale cream (IIa-IIb), spores reticulate and finely ornamented ..... ***R. viscida***

1b Hardly medium-sized species with habit less thick, pileus soon dry, basically yellowish, at times with a touch of fulvous brown or olivaceous shades, context changing to grey in wet weather, spore print white, spores medium-sized, echinulate and to a variable extent reticulate-connected (cfr. yellow forms of *R. atropurpurea*, lacking any veil remnants and having stipe base unreactive to KOH) ..... ***R. ochroleuca***

Sezione POLYCHROMAE R. Maire

R. Maire 1910, Bull. Soc. Myc. Fr., 26: 121, emend.

Diagnosi originale

Chapeau à revêtement visqueux et séparable, pourvu de cystides, versicolore, à marge arrondie ordinairement striée. Chair fragile. Lamelles égales, fragiles, arrondies en avant, libres ou sublibres. Spores en masse crème-ocre à jaune ocracé (rarement blanc-jaunâtre, et alors chair douce ou à peine âcre dans la jeunesse et absence de pigment rouge).

Typus (qui designato): *R. romellii* Maire

CARATTERI GENERALI

Taglia generalmente media o grande, piccola solo in qualche forma delle microsilve alpine, colori assai variabili, di rado puramente rossi, consistenza più o meno soda o subdura, sapore dolce, raramente amarescente o un po' acre nelle lamelle, epicutis a dermatocistidi nudi o incrostati, questi ultimi non accompagnati in nessun caso da ife primordiali. Pur potendo mancare eccezionalmente sul cappello (*Auratinae*), i dermatocistidi sono sempre presenti almeno nella corteccia del gambo. Velo assente.

Sez. POLYCHROMAE R. Maire, emend. (subgen. *Polychromidia* Romagn. p.p.)

subsez. ***Xerampelinae*** Singer
subsez. ***Melliolentinae*** Singer, emend.
subsez. ***Integriforminae*** Bon, emend.
serie *Decolorans* ad int.
serie *Romellii* ad int.
serie *Trimbachii* ad int.
serie *Straminea* ad int.
subsez. ***Paraintegrinae*** Sarnari
serie *Integriformis* ad int.
serie *Seperina* ad int.
subsez. ***Auratinae*** Bon

Subsez. XERAMPELINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 240.

Diagnosi originale

Fleisch weiß, dann gelb oder braun, auch gelb oder braun anlaufend, durch $FeSO_4$ - wenigstens bei R. xerampelina - *grün, mild, eigentümlich (meist nach Trimethylamin) riechend. Sporenstaub (? I-) II (-III). Rand etwas scharf oder - gewöhnlich - stumpf.*

Typus (automatico): *R. xerampelina* (Schaeffer) Fries

Polychromae a carne imbrunente che si colora di verde con il $FeSO_4$ e di rosso con l'acqua anilinata, odore di aringhe (trimetilammina) in vecchiaia, dermatocistidi non incrostati, a contenuto debolmente rifrangente, spore a verruche isolate o debolmente crestate. Sporata da crema a giallo chiaro.

KEY TO THE SPECIES OF SUBSECTION XERAMPELINAE

1a Species from the sylvan zone associated with broadleafed trees **2**

1b Species from coniferous forests associated with *Picea*, *Pinus*, *Larix* **3**

1c High mountain species found above the tree-line, even under willows in wet riparian sites of continental Europe **4**

2a Species considerable for its fleshiness and stature, associated with beeches in its most typical forms, pileus subvelutinous or with concentrical marbling, vinaceous red to orange brown, with more or less extended yellow or green specklings, stipe at times with brown scales, spore print IIIb-c to IVa, epicutis hairs short-celled, more or less ampullaceous, dermatocystidia minute, aseptate, 4-6 µm wide ..... ***R. faginea***

2b Colourful species from sunny sites on siliceous soil (see the possible colour forms considered here below), medium/small-sized, pileal surface opaque to subvelutinous, at times shiny, spore print ochre, spores with more or less isolated spines, epicutis including hairs relatively bulky and polymorphic, with dermatocystidia little reacting to SBA (the epitypus is reported to have a vinaceous red pileus, spores measuring 7,5-9 × 6,2-6,7 µm and epicutis hairs more or less subulate) ..... ***R. graveolens***

- Pileus purple, at times blackish in the middle ..... "*R. purpurissata*"
- Similar to the above but with hairs and spores both larger ..... "*R. rubida*"
- Pileus basically green, finely rugose or with darker concentric marbling, epicutis hairs ampullaceous ..... "*R. cicatricata*"
- Similar to the above but hairs only slightly ampullaceous and dermatocystidia more numerous ..... "*R. elaeodes*"
- Pileus brownish like in *R. mustelina* ..... "*R. fusca*"
- Pileus with multicoloured specklings, stipe short ..... "*R. brevis*"
- A look-alike of *R. amoena* slightly larger in stature, pileus purple, velutinous, stipe red flushed ..... "*R. amoenoides*"
- Pileus purple, stipe thin and reddish, lamellae broad and distant ..... *R. amoenoides* var. *gracilipes*
- Pileus purple, becoming slowly yellow ..... "*R. gilvescens*"
- Pileus pruinose, violet or partly olivaceous, spore print somewhere between cream and ochre .. .. "*R. cretata*"
- Small species with copper red pileus, spores with prominent spines and hairs 3-5-(7) µm wide ..... "*R. barlae* var. *pseudomelliolens*" ss. Bon
- Large species found under hornbeams, with violaceous red pileus up to 80-150 mm, spores echinulate, measuring 8-12 × 6,5-10 µm (probably an atypical ecotype of *R. faginea*) .... "*R. pseudomelliolens*" ss. Reumaux

3a Species with pileus basically of purple red colouring, seldom fading to olivaceous or fuscous ochraceous in the center, stipe extensively carmine red in the typical forms, spore print about IIIc, spores 8-11 × 6,5-8,2 µm ..... ***R. xerampelina***

- Differing from the previous one in its smaller stature and brittler context, the faded colours and the spores measuring only 7-8,5 × 5,3-6,7 µm ..... "*R. amoenipes*"

3b Species with pileus brown ochre to pinkish brown or olivaceous brown, pileal surface opaque or finely velutinous, spore print IIIb-c, seldom IVa, spores 8,5-10,4 × 7,2-8,3 µm or even smaller, with spines not higher than 1 µm, stipe rarely with a pink flush ..... ***R. favrei***

- Very rare and poorly known species from humid *Picea* forests, pileus mostly green, spores smaller with thinner ornamentation, measuring 7-8,5 × 6-7 µm (cfr. *R. amoenipes*) .... "*R. clavipes*"

4a Species fruiting in willow woods in coastal plain sites especially of northern Europe, found also in the alpine zone ("*R. chamiteae*"), pileus 35-70-(90) mm across, copper red to purple red or bronze brown, with more or less extended yellow marbling, stipe often reddish, spores with slightly connected or ridged warts, dermatocystidia staining black in SBA .... ***R. subrubens***

4b Dermatocystidia unreactive in SBA, size on average smaller **5**

5a Very common species of high elevation pastureland on siliceous soil, pileus 20-45-(55) mm, violet red to brown or yellow, with possible olivaceous shades, spore print ochre, IIIa to IIIc ..... ***R. pascua***

5b Species known for a single basidiome collected in a site with *Salix reticulata* and *Betula nana* in Norwegian Lapland, remeaning the above for the epicutis unreactive in SBA, but apparently differing in lack of dermatocystidia and growing on calcareous soil .... *"R. nuoljae"*

5c Unconfirmed species from the Alps, context relatively soft and pileal margin sulcate, spore print pale cream (or ochre?), dermatocystidia unreactive in SBA (possibly a form of *R. pascua*) ..... *"R. felleaecolor"*

Subsez. MELLIOLENTINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 241, emend.

Diagnosi originale

Fleisch weiß, dann gelb oder braun, auch gelb oder braun anlaufend, durch $FeSO_4$ nicht grün, sondern normal reagierend, mild oder wenig scharf. Geruch etwas honigartig oder mohnartig bei Zersetzung. Sporenstaub sehr licht II. Rand fast stumpf oder - gewöhnlich - stumpf.

Typus (automatico): *R. melliolens* Quélet

Polychromae a carne vivamente ingiallente o moderatamente imbrunente, che si colora di rosa arancio con il $FeSO_4$ e mai di rosso a contatto dell'Anilina. Sapore dolce, odore talvolta di miele essiccando (mai di aringhe o di trimetilammina), sporata crema, giallo chiaro nella sola *R. annae*. Spore subglobose, finemente ornate e almeno in parte reticolate. Epicutis contenente dermatocistidi multisettati, cortamente articolati, privi di incrostazioni, a contenuto pochissimo rifrangente, quantunque ingrigente in SBA.

KEY TO THE SPECIES OF SUBSECTION MELLIOLENTINAE

1a Spore print cream **2**

1b Species from evergreen or deciduous oaks woods with spore print light yellow (IVa), habit sometimes reminding that of the *Tenellae*, pileal surface humid and shiny, ochre yellow to copper brown, to vinaceous pink, context distinctly yellowing, spores subglobose, subreticulate, having warts up to 0,65 µm ..... ***R. annae***

2a Species found under various broadleafed trees, pileus humid and shiny, apple pink-red to copper brown or partly apricot, very rarely violaceous red or pale ochraceous lemon-yellow, context turning to bright yellow, spore print about IIa or IIb, spores large, subglobose, about 9-11 µm, with a very fine net-work including warts hardly visible in optical microscopy ..... ***R. melliolens***

2b Species associated with oaks (*Quercus* s.l.), having pileal surface dry to finely velutinous, pink or vinaceous red, context slowly staining rusty brown instead of yellowing, spore print about IIc, spores 7-9 × 6-7 µm, with a net-work easily visible, the warts included measuring 0,3-0,4 µm, epicutis with dermatocystidia not reacting to SV ..... ***R. dryophila***

Subsez. INTEGRIFORMINAE Bon 1986, Crypt. Mycol., 7 (4): 303, emend.

Diagnosi originale

Species multicolores nec purae rubrae, pileocystidiis veris i. e. incrustationibus acidostabilibus destitutis. Typus sp.: R. romellii *R. Maire.*

Typus (originale): *R. romellii* Maire

Polychromae con epicutis a dermatocistidi non incrostati, privi di setti o a setti poco numerosi (eccezione unica *R. carpini*), sporata gialla, per eccezione crema o ocra. Carne generalmente inodore, in ogni caso non odorante di trimetilammina, un po' imbrunente (vivamente nel solo caso di *R. carpini*), talvolta annerente, non inverdente con $FeSO_4$ né arrossante con Anilina.

KEY TO THE SPECIES OF SUBSECTION INTEGRIFORMINAE

1a Species growing under conifers or birches with an exclusively or mainly northern distribution, context turning blackish when exposed and reddish with alkali, maybe at times changing to grey when water-soaked, spore print cream or ochre (**Series *Decolorans*** ad int.) **2**

1b Medium to large-sized species growing under *Picea* or birches on boggy soil, pileus shining, copper red to brownish red or violaceous, stipe and lamellar edge at times with a reddish tinge, flesh almost unchanging, spore print ochre, spores more or less reticulate, dermatocystidia long, cylindraceous, 4-6,5 µm wide (**Series *Paludosa*** ad int.) **4**

1c Medium-sized species growing under broadleafed trees, flesh little changing to distinctly browning, spore print deep ochre or decidedly yellow, spores medium-sized, more or less reticulate, dermatocystidia inconspicuous, hardly to be found because of their minute size (3-6 µm wide) and their content often emulsified, scarcely reacting in SV (**Series *Romellii*** ad. int.) **5**

1d Dermatocystidia more prominent than in the above Series, broader and even well characterized, content always with corpuscles greying in SV, spores more or less reticulate - warts almost isolated or hardly crestate only in *R. lutensis* - spore print ochre to yellow (badly circumscribed group of species connected to the previous Series by an unbroken chain of intermediates) (**Series aff. *Romellii*** **10**

1e Species distinctly colourful, colours often brownish, context more or less browning, spore print yellow, exceptionally cream or ochre, spores large or huge, echinulate - cfr. *R. carpini* at 21a, with strongly yellowing context and multiseptate dermatocystidia (**Serie *Straminea*** ad int.) **16**

1f Species hardly to be classified, regarded here at least provisionally as *Integriforminae* **22**

1g Species excludendae elsewhere included among the *Polychromae-Integriforminae*, but most likely to be ascribed to other groups **24**

Series DECOLOLORANS

2a Medium-sized species from boggy coniferous forest with blueberries, in Lapland growing under *Betula pubescens* ssp. *czerepanovii*, pileal surface opaque, orange or partly reddish, spore print cream (IIc-d), spores large, 9-12 × 7-9 µm, partly cristate-reticulate ..... ***R. decolorans***

2b Northern species usually growing under *Betula*, pileus shiny, spore print ochre, about IIIa or IIIb, rarely cream, spores not larger than 8,8 × 7,5 µm **3**

3a Small-sized species from swampy areas with *Betula* and *Sphagnum*, pileus orange red to violaceous red to brownish, seldom with a greenish shade in the middle, context strongly greying when water-soaked, spores more or less reticulate-cristate, 7,2-8,8 × 6-7,4 µm, dermatocystidia clavate, huge, 6-12-(14) µm wide ..... ***R. rivulicola***

3b Medium to large-sized species growing under birches on relatively dry soil, very rare under conifers, pileus copper red to bronze brown, at times partly or entirely greenish yellow, spores subreticulate, measuring 6,5-8 × 5,6-6 µm, dermatocystidia 4-8-(11) µm wide ..... ***R. vinososordida***

Series PALUDOSA

4a Large-sized species growing in boggy coniferous forests, but also under *Betula pubescens* ssp. *czerepanovii* in Lapland, pileus 60-160-(220) mm across, bright red to orange red, spores 8-10,5 × 6,4-8,4 µm wide ..... ***R. paludosa***

4b Medium-sized, poorly known species from swampy soil under *Picea* and birches, pileus brick red to purplish brown or violaceous, lamellae pale citron yellow or with a red edge, stipe often flushed, context hardly yellowing, spores with warts catenulate or partly connected, measuring 7-9 × 5,5-6,5 µm (cfr. *R. velenovskyi*, smaller in habit, with encrusted dermatocystidia and spores lacking connections) ..... ***R. cruentata***

Series ROMELLII

5a Species from *Quercus ilex* woods, with pileus subvelutinous, rosy to vinaceous red, flesh staining strongly brownish yellow, $FeSO_4$ negative, then slowly greenish grey, lamellae broad and crowded, spore print IVc, spores subglobose, about 8-9,6-(10,4) × 7,2-8,2-(8,8) µm ..... ***R. prinophila***

5b Not with the above combination of characters, species often more mesophytic, normally reacting with $FeSO_4$, context staining brown slightly and only locally **6**

6a Spore print IIIc to IVb, spores shortly cristate to subreticulate **7**

6b Spore print deep yellow, IVd or rarely IVc, spores markedly reticulate, dermatocystidia having emulsified content **8**

7a Unquestionably rare species from cool broadleafed woods inadequately confirmed, with spore print IVb, spores considerably oblong measuring 6,5-9,4 × 5,9-7 µm, with spines on average high, epicutis hairs more or less tapering ..... ***R. pseudoromellii***

7b Medium-sized, stocky species from beech woods, with quite hard flesh, pileus surface opaque, pink to violaceous red, spore print IIIc or IVa, epicutis with large hairs, 4-7 µm wide ..... ***R. curtipes***

8a Very rare species having pileus dry and somewhat velutinous like in *Olivaceinae* group, stipe at times flushed reddish pink, spores about like those of *R. romellii*, epicutis hairs very long and tapering ..... ***R. alternata***

8b Common species from broadleafed woods with pileus surface usually shiny, stipe never pinkish **9**

9a Pileus multicoloured with shiny surface, violaceous red to partly green, or yellow etc., gaiac reaction variable, sporal spines more prominent than in the following species ..... ***R. romellii***

9b Pileus an almost pure, more or less deep, red, whitish in "var. *albocretacea*", context hardly reacting with gaiac, odour at times like that of *R. risigallina* in old specimens gone soft, spores relatively roundish with lower ornamentation ..... ***R. rubroalba***

Series aff. ROMELLII

10a Small squat species growing along the side of paths in broadleafed woods, especially under *Quercus*, pileus orange red to copper red or purple red, spore-print IIIc to IVb, spores verrucose with short ridges, dermatocystidia faintly diverticulate (cfr. *Rhodellinae*, softer and more slender with multiseptate dermatocystidia ..... ***R. lutensis***

10b Spores subreticulate to reticulate, pileus more colourful or not pure red **11**

11a Mediterranean species associated with *Quercus*, especially *Quercus ilex*, pileus dry or subvelutinous, mostly purple or violaceous or brown-reddish **12**

11b Northern medium-sized species associated with birches, *Picea* or *Salix*, pileus multicoloured or greenish, epicutis with slightly diverticulate dermatocystidia, 0-2 septate and 4-8-(9) µm wide **14**

12a Common species from holm oak woods having context staining vividly brown-yellow, reaction negative with $FeSO_4$, then slowly grenish grey, pileus 40-70 mm across, basically purple red, but easily paling, lamellae broad and crowded, spore print IVc, spores subglobose, measuring 8-9,6-(10,4) × 7,2-8,2-(8,8) µm ..... cfr. ***R. prinophila***

12b Rare mediterrananean species, phenocopia of *Russula laeta*, growing under deciduous oaks; spores rounded about 7,4-9,5 × 6,6-7,9 mm; epicutis lacking encrustations with numerous, narrow and very long dermatocystidia, 0-1 (2) septate ..... ***R. pseudolaeta***

12c Rare mediterranean species having context hardly changing, which turns pale pinkish-orange with $FeSO_4$, spores subglobose **13**

13a Pileus purple red to rarely brownish, lamellae outstandingly distant, spore print towards IVa or IVb, spores subreticulate-cristate, about 6,4-8,5 × 5,6-7,8 µm, epicutis with more or less ampullaceous hairs, at times huge ..... ***R. oreades***

13b Pileus lilac to pale violaceous brown, spore print IIIc-IVa, spores measuring 7,2-8,8-(9,2) × 6,4-7,8 µm, reticulate, with warts 0,5-0,6 µm high, epicutis including thin hairs and dermatocystidia 4-7-(8) µm wide, mostly shortly clavate, basically aseptate ..... ***R. lividopallescens***

14a Spore print ochre, not deeper than IVa **15**

14b Pileus subvelutinous, spore print yellow, about IVc-d, spores 7-9,5 × 6-8 µm, epicutis with large blunt hairs, 4-6-(8) µm wide ..... ***R. fulvograminea***

15a Pileus shiny at least when collected, stipe often flaring at the apex, spore print IIIa to IVa ..... ***R. violaceoincarnata***

15b Pileus dry and opaque, yellowish green in colour, flesh soft, staining rusty ochre, pileal hyphae with a granular pigment reminding that of the *Griseinae* ..... ***R. graminea*** Ruots. & Vauras ined.

Series STRAMINEA

16a Species growing under *Picea* (also broadleafed trees according to Bon & Weholt 1986), pileus bronze green to dark brown like in the *Griseinae*, spore print only cream, towards IIc, spores 8-10 × 6,5-8 µm ..... ***R. aerina***

16b Tiny arctic-alpine species with 2-spored basidia, so far known only from the pastureland of Scandinavian mountains, pileus basically brown, spore print deep ochre, spores 9-11 × 7,5-9 µm, dermatocystidia 3-6 µm wide, having no more than 2-3 septa ..... ***R. pseudocampestris***

16c Species from the sylvan zone associated with broadleafed or coniferous trees, spore print yellow, spores very large or sometimes huge, 9-12-(13) × 9-11-(12) µm **12**

17a Large-sized species from Moroccan cork oak woods with context turning brown, pileus reddish brown like in *R. foetens*, spore print about IIIc-IVa (cfr. mild forms of *R. globispora*, having spore print apparently darker) ..... ***R. straminea***

17b Spore print distinctly yellow, about IVc or IVd, rarely IVb **18**

18a Northern species associated with *Picea abies*, pileus multicoloured 3-18 cm across, often brownish or violaceous, even blackish or greenish in the middle, spores 9-11,2 × 7,2-9,5 µm, spore print IVd ..... ***R. olivobrunnea***

18b Species with a more southern distribution **19**

19a Small-sized species from broadleafed woods unconfirmed as yet, taste subacrid, spores about 12-15 µm (close to *R. globispora*, from which it would seem to differ in the context not yellowing and the multiseptate dermatocystidia ..... ***R. maximispora***

19b Species reminding of *R. integra* for its facies and colours, but epicutis has only unencrusted dermatocystidia, never primordial hyphae **20**

20a Medium-sized species associated with *Pinus*, spores 8-11 × 7,5-9,2 µm, epicutis hairs blunt, 3-6 µm wide (cfr. the large-sized *R. campestris* var. *meridionalis*, growing under cedars and maritime pines) ..... ***R. campestris***

20b Critical or unsufficiently confirmed species, described as variants of *R. integra*, of which they share the subulate epicutis hairs, but dermatocystidia are reported without encrustations **21**

21a Kind of large *R. integra* with whitish pileus, growing under firs and beeches on sandy, siliceous soil ..... ***R. integra*** f. ***gigas***

21b Field characters much like those of *R. integra*, but spores with tiny catenulate warts, spore print IVd ..... ***R. integra*** var. ***phlyctidospora***

Series anomalous INTEGRIFORMINAE

22a Species with a middle-European or Mediterranean distribution, having pileal surface shiny **23**

22b Northern, medium-sized species from boggy forests with *Picea* and *Sphagnum*, pileus velutinous, purple-red or brown, stipe big and clavate, mostly widely carmine pink coloured, spore print IIIb-c, spores subglobose, 8-10 × 7-9 µm, partly reticulate-cristate, epicutis with large dermatocystidia, 8-11-(14) µm wide, among subfusiform and subulate hairs (transition towards *Betulinae*) ..... ***R. taigarum***

23a Colourful species growing under hornbeams with distinctly yellowing context, spore print IVd-e, spores echinulate, about 7,6-10 × 6,8-8,3 µm, dermatocystidia multiseptate with scarcely refractive content ..... ***R. carpini***

23b Mediterranean species associated with *Quercus* on calcareous soil, more frequent under holm oak, context becoming grey when wet, pileus pale bluish to vinaceous, more or less fading, yellow all over in f. *holoxantha*, spore print IVb, spores large, reticulate like in *R. aurea*, dermatocystidia conspicuous, monocellular, long and more or less strangulated ..... ***R. nuragica***

Species Excludendae

24a Critical species collected under scots pine in Scandinavia, pileus dark olivaceous brown, spores shortly cristate, 8-11 × 7-8 µm, dermatocystidia with 0-1 septa (according to the type revision by Ruotsalainen and Vauras it should be a *Betulinae*) ..... ***R. fusconigra***

24b A small look-alike of *R. integra* with subacrid taste and sulcate pileal margin, spore print about IVa, spores shortly cristate, 9-10,5 × 7-7,5 µm, dermatocystidia 3-5-(7) µm wide [the latter ones encrusted according to Ruotsalainen's type revision (ined.)] ..... ***R. trimbachii***

Subsez. PARAINTEGRINAE Sarnari, subsez. nov.

Diagnosi originale

Habitu ad instar Polychromarum, *coloribus variabilibus, epicute cum dermatocystidiis incrustatis, sed hyphis primordialibus carente. - Typus:* R. integriformis *Sarnari*

Typus: *R. integriformis* Sarnari

Polychromae con epicutis a dermatocistidi incrostati, sempre priva di ife primordiali. Carne dolce, poco cangiante o un po' imbrunente, talvolta annerente, direttamente o dopo arrossamento preliminare, sporata ocra o gialla.

KEY TO THE PARAINTEGRINAE

1a Small or just medium-sized species growing in dry sites under broadleafed or coniferous trees, pileus bright red to copper red, or vinaceous pink, with a low and broad umbo, spore print ochre (IIIb), stipe at times spotted red at base, context hardly changing, spores with isolated warts, measuring 6,7-8,8 × 5,6-6,5 µm, dermatocystidia long and thin, having few septa (cfr. *R. cruentata* in Subsect. *Integriforminae*, differing in medium-large size, lamellae with a lemon-yellow tinge or red edge, spores subcrestate to partly reticulate-connected, dermatocystidia unencrusted, habitat in swampy sites with birches or *Picea*) ..... ***R. velenovskyi***

1b Spore print yellow **2**

2a Fleshy and squat species associated with *Quercus* on calcareous soil, especially frequent under *Quercus ilex*, pileus dry, violaceous red to brownish or green yellow, spore print IVc-d, context turning black on exposure and staining red with formalin, spores warty with thin ridges (cfr. *R. rhodomarginata*, a very small more heliophilous and acidophilous species, with centrifugal fading of the pileal colour and distant lamellae) ..... ***R. seperina***

2b Medium/large-sized species growing in broadleafed woods, pileus pure red, context thick and subfirm, spores globose with fine, scattered and partly connected warts, context which becomes grey in wet weather turning blue with gaiac, dermatocystidia cylindraceous, long and thin (possible forms with hardly or not encrusted cuticle) ..... ***R. tinctipes***

2c Not with the above association of characters, context little changing on exposure or not redding with formalin **3**

3a Species from coniferous forests especially associated with *Picea*, colours mostly reddish brown like *R. integra*, but habit on average smaller, spore print IVa to IVc, dermatocystidia thin, 3-6-(7) µm wide **4**

3b Absolutely rare species known from a single station under *Quercus* in mediterranean zone, habit like *R. cuprea*, with context brittle and bitter, pileal surface humid and shiny, generally violaceous brown, margin broadly sulcate-tuberculate, spore print IVe, dermatocystidia large and long, 5-10-(12) µm wide, lacking septa ..... ***R. picrea***

4a Northern species very rare on the Alps, pileal margin smooth, spore print IVc, spores 6,6-8,8 × 5,8-7,2 µm, with isolated warts, dermatocystidia filamentous, 2,5-6-(7) µm wide ..... ***R. integriformis***

4b Very rare and confused species with subacrid taste and sulcate pileal margin, spore print about IVa, spores shortly crestate, measuring 9-10,5 × 7-7,5 µm, dermatocystidia 3-5-(7) µm wide [naked-walled according to Bon, encrusted in the type studied by Ruotsalainen (ex verbis)] ..... ***R. trimbachii***

Subsez. AURATINAE Bon 1986, Doc. Mycol., 65: 53.

Diagnosi originale
Russulae sectionis Alutaceae *(ss. l. = species dermatocystidiis hyphisque primordialibus acido-stabilibus carentes), phenoli ope vulgari haud vivide violaceo-purpurea, ac stipite saepissime albo. - Typus sp.:* R. aurea *Pers. (*aurata *Auct.)*

Typus (originale): *R. aurea* Persoon

Polychromae con epicutis omogenea, formata dunque di soli peli, dermatocistidi sempre presenti nella corteccia del gambo, carne che si colora di bruno avana con il Fenolo.

Une seule espèce : **Russula aurea**

Sezione PARAINCRUSTATAE Sarnari, sez. nov.

Diagnosi
Epicute ex hyphis primordialibus atque dermatocystidiis constanti, sapore dulci, amaro, vel moderate in lamellis acri, aliquando paulum styptico, sporarum pulvere e cremeo flavida, carne plus minusve brunnescenti vel nigrescenti, velo carente. - Typus: R. melitodes *Romagnesi*

Typus: *R. melitodes* Romagnesi

CARATTERI GENERALI
Epicutis del tipo misto, comprendente ife primordiali e dermatocistidi parimenti incrostati, questi ultimi non sempre annerenti in SBA. Cappello policromo, altrimenti rosso o arancio, sporata da crema pallido (subsez. *Lepidinae*) a ocra o giallo (subsez. *Integrae*), carne imbrunente con moderazione, tuttavia nettamente annerente in qualche specie. Sapore mite, astringente o amaro, per eccezione un po' acre limitatamente alle lamelle. Velo sempre assente.

Sez. PARAINCRUSTATAE Sarnari

subsez. ***Integrae*** R. Maire, emend.
serie *Integra* ad int.
serie *Rhodomarginata* ad int.
subsez. ***Lepidinae*** (Melzer & Zvara) Singer

Subsez. INTEGRAE R. Maire 1910, Bull. Soc. Myc. Fr., 26: 121, emend.

Diagnosi originale
Chair ne noircissant pas, douce ou subâcre dans la jeunesse.

Typus (automatico): *R. integra* (Linné) Fries

Specie policrome con epicutis a struttura mista, sporata gialla (la combinazione sporata crema scuro e sapore piccante nella sola *R. tyrrhenica*). Carne imbrunente nella specie tipo e forme correlate, tuttavia nettamente annerente in altre (in quest'ultimo caso la Formalina provoca un deciso arrossamento).

KEY TO THE SPECIES OF SUBSECTION INTEGRAE

1a Species with context slowly changing to black, staining red with a drop of formalin (**Series *Rhodomarginata***) **2**

1b Species with context fairly changing to brown or grey, reaction to formalin not distinctive (**Series *Integra***) **3**

2a Small mediterranean species associated with oakwoods with *Cistus* and *Erica*, pileal surface opaque, pink red to violaceous to "bread crust", distinctly paling in the middle, margin smooth, lamellae notably distant, context quite firm, spore print IVb ..... ***R. rhodomarginata***

2b Boreal species whose study is being carried out by Ruotsalainen & Vauras, so far known only from Fennoscandia ..... ***R. kallioi***

3a Species associated with cool deciduous woods, especially birches, or with pines, pileus green yellow to violaceous pink to brownish ochre, context becoming grey in wet weather, spore print IVb-c, spores medium-sized, with isolated spines, epicutis hairs outstandingly thin mixed with primordial hyphae and dermatocystidia hardly thicker, the latter often capitate ..... ***R. cremeoavellanea***

3b Context becoming fairly brown or little changing, the following species presenting different combinations of characters **4**

4a Spores with isolated spines, spore print medium yellow IVb-IVc (IVd) **5**

4b Small mediterranean species growing under *Cistus* on sandy soil, with taste somewhat acrid, spore print ochraceous-cream, IId or IIIa, spores partly reticulate-cristate, epicutis including multiseptate dermatocystidia and tapering primordial hyphae, exudate resistant to ammonia and storage in herbarium ..... ***R. thyrrenica***

4c Medium-sized species from broadleafed woods, especially *Quercus*, pileus vinaceous, rarely brownish, or fading to olivaceous-ochre in the middle, spore print IVb, spores about 8-10 × 6,2-8,4 µm, the ornamentation very thin, with just a hint of network ..... ***R. carminipes***

5a Medium-sized and firm species from coniferous forests, dwelling mostly on mountainous calcareous soil, pileus distinctly multicoloured, brown to purple, green, yellow etc., spore print about IVc, spores echinate, measuring about 8,8-11,2 × 7,4-9 µm, epicutis with dermatocystidia narrow ..... ***R. integra***

5b Species less fleshy than the above, sometimes with a slightly acrid taste, spores smaller, about 8-9,2-(10) × 6,7-8-(9) µm, spore print IVd, dermatocystidia large and clavate, 5,5-12,5 µm wide ..... ***R. integra*** var. ***oreas***

5c Not with the above combinations of characters, species growing under broadleafed trees **6**

6a Pileus multicoloured, dark brown to purple red or violaceous, sometimes olivaceous or blackish in the middle, context with a honey-like odour when drying, epicutis with primordial hyphae subulate, mostly encrusted only in the lower portion, spores 8,5-10 × 7-9 µm ..... ***R. melitodes***

6b Small species with red, orange or purple pileus, odour fruity with a hint of cedar wood, taste of lamellae slightly astringent, epicutis with long, thin dermatocystidia and poorly differentiated primordial hyphae ..... ***R. laeta***

Subsez. LEPIDINAE [Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 63] Singer 1932, Beih. Bot. Centralbl., 49 (2): 242.

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Cute pilei velutina, adnata. Solum in R. lepida *ac correlatis speciebus cystidiata.*

Typus (automatico): *R. lepida* Fries

Carpoforo duro ed assai carnoso, margine pileico sempre liscio, cuticola adnata, vellutata, come annebbiata da una pruina impalpabile, colori da rosso-arancio a bruno porpora, carne più o meno ingiallente, talvolta vivamente sui toni zafferano, sapore amaro o un po' mentolato, sporata crema pallido, epicutis a ife primordiali e dermatocistidi incrostati, questi ultimi insensibili alla SBA, come gli stessi cistidi imeniali.

KEY TO THE SPECIES OF SUBSECTION LEPIDINAE

1a Pileus pure red to pale carmine, at times orange red or partly yellow, context slightly yellowing on drying, taste of lamellae typically mentholated-refreshing ..... ***R. lepida***

1b Pileal colouring violaceous purple to cigar brown, only exceptionally bright and relatively pure red, context strongly changing to saffron, taste bitter ..... ***R. amarissima***

Sezione TENELLAE (Quélet) Sarnari

(Quélet 1888, Fl. Mycol. Franc.: 336) Sarnari, stat. nov.

Diagnosi originale

Peridium incarnat, rouge, jaune ou olive. Espèces douces, grêles et fragiles.

Typus (qui designato): *R. puellaris* Fries

CARATTERI GENERALI

Taglia e carnosità modeste, gambo più o meno slanciato, spesso claviforme, margine pileico scanalato ed in genere tubercolato almeno a maturità (raramente in misura poco percettibile), sapore dolce, per eccezione subpiccante in frammenti di lamelle, sporata crema, ocra o gialla, reazione alla tintura di Guaiaco per lo più positiva. Basidi tendenzialmente corti. Epicutis a dermatocistidi plurisettati, non incrostati. Fini incrostazioni sono comunque possibili in casi eccezionali (cf. *R. impolita* e qualche specie affine a *R. odorata* di recente pubblicazione). Velo assente.

Sez. TENELLAE Quélet (subgen. *Tenellula* Romagn.)
- subsez. ***Puellarinae*** Singer
  - serie *Puellaris* ad int.
  - serie *Versicolor* ad int.
  - serie *Odorata* ad int.
  - serie *Laricinoaffinis* ad int.
- subsez. ***Rhodellinae*** (Romagn.) Bon
- subsez. ***Laricinae*** (Romagnesi) Bon, emend.
- subsez. ***Betulinae*** (Romagnesi) Sarnari (*Sphagnophilae* Singer)

Subsez. PUELLARINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 237-238.

Diagnosi originale

Hut 1,5-8,5 cm, nicht genabelt, aber bisweilen gebuckelt und meist bald in der Mitte breit-vertieft. Stiellänge: Hutbreite (bei sehr kleinen Arten) = 1 (bei den meisten aber) → 1. Gesamt-habitus meist vom Typus der R. puellaris. *Ganz mild, seltener scharf. Sporenstaub II. Bau brüchig, Fleisch oft gilbend, Rand stumpf (bis fast stumpf), Huthaut kahl, selten mit weißen flüchtigen Flöckchen oder dichtkörnig, schmierig, überwiegend rot, purpurn, lila, bräunlich usw., höchstens mit wenig Grün, mit Cystiden.*

Typus (originale): *R. puellaris* Fries

Colori variabili, carne più o meno marcatamente ingiallente. Sporata crema, ocra o gialla. Le spore possono raggiungere, in casi eccezionali, 8-10 (10,5) × 7-8,5 µm (serie *Laricinoaffinis*), basidi non oltrepassanti di regola 50 × 12 (13) µm, habitat preferibilmente sotto latifoglie, tuttavia, all'occasione, anche sotto conifere.

KEY TO THE SPECIES OF SUBSECTION PUELLARINAE

1a Colourful species from *Picea* forests having context distincly yellowing, spore print about IIIc, spores 8,5-10,5-(11) × 6,7-8,8 µm, echinulate and variously cristate (in Subsect. *Laricinae*) ..... ***R. sapinea***

1b Not with the above association of characters **2**

2a Spores with isolated or subridged warts, never distinctly oblong or larger than 9 × 7 µm, context more or less markedly yellowing, taste mild, spore print cream or ochre (**Series *Puellaris* ad int.**) **3**

2b Acidophilic species growing under birches or conifers mostly on sandy soils, even under *Cistus* in mediterranean zone, taste moderately acrid, spore print ochre, spores mostly distinctly oblong and reticulate to a variable extent (**Serie *Versicolor* ad int.**) **5**

2c Species growing under broadleafed trees, context moderately yellowing, taste mild, spores subreticulate, measuring about 6,5-8,5-(9,5) × 5,7-7-(7,5) µm, spore print yellow, IVa to IVc (**Series *Odorata* ad int.**) **8**

2d Very rare and insufficiently unconfirmed species from the French Atlantic or Mediterranean coast growing under *Quercus ilex* and *Q. suber*, spores large, subglobose, measuring about 8,5-10 × 7,5-8,5 µm (**Series *Laricinoaffinis* ad int.**) **10**

2e Critical or unconfirmed species having context not noticeably yellowing, spore print ochre, possibly deep cream **11**

3a Species growing under conifers, rarer under broadleafed trees, context changing to yellow all over, pileus mostly red to violet, fading to brownish ochre, odour not distinctive, spore print IIc, spores about 7-9 × 5,7-7,2 µm, with isolated or slightly ridged warts, dermatocystidia with few septa ..... ***R puellaris***

3b Smaller and less yellowing species insufficiently known, growing in humid sites under broadleafed trees, spores with numerous connections, measuring 6,5-7-(8) × 5-6-(6,5) µm ..... ***R. minutalis***

3c Species growing under broadleafed trees, with context moderately yellowing and odour of *Pelargonium*, spores smaller than in *R. puellaris*, projecting isolated spines **4**

4a Very rare species with small and slender size, growing under aspens, lindens and hazels, pileus 20-30-(50) mm across, lilacinous violet to brownish, odour strong and lingering of *Pelargonium*, spore print cream, never darker than IIc ..... ***R. terenopus***

4b Relatively larger species mostly growing under hornbeams, pileus 30-46-(55) mm, colours variable, often mixed and fading, context slightly less yellowing than in *R. terenopus*, odour of *Pelargonium* fainter and less lingering, spore print ochre, IIIa to IVa ..... ***R. versatilis***

5a Very common mediterranean species associated with *Cistus* and *Erica*, spores subreticulate measuring 7-9 × 5,5-6,5 µm ..... ***R. cistoadelpha***

5b Mesophitic species found under birches, at most under conifers **6**

6a Relatively thick-set calciphilous species growing on dune sandy soil or stony landslides, pileus 30-80 mm across, lacking green tinges, context changing strongly and extensively to saffron-yellow like in *R. puellaris*, spores 7,5-9 × 5-6 µm, with a complete net-work ..... ***R. pseudopuellaris***

6b Thinner species with context exhibiting a moderate or weak yellow colour change 7

7a Common species of birches, very rare under conifers, pileus reddish or violaceous, more or less fading to olivaceous ochre in the middle, taste subacrid, spore print IId to IIIb, spores subreticulate, very small, measuring 5,7-7,2 × 5,2-5,7 µm (but macrosporic forms have spores up to 6,2-8,5-(9,2) × 5-6-(7) µm), cystidia 7-9 µm wide .....

7b Pileus of subuniform purplish violet colouring, taste almost mild, spore print IIIa-b, spores with a finer warty ornamentation than in the previous species (cfr. var. *laeticolor*, with spore print IIIc and taste somewhat acrid) ..... ***R. versicolor*** var. ***intensior***

7c Absolutely rare species found under birches, no longer convincingly reported after the original description, pileus lilacinous violet, lacking any green tinges, context acrid, becoming moderately yellow, spores with an almost complete net-work, cystidia 11-13 µm wide ..... ***R. unicolor***

8a Mediterranean species associated with *Quercus*, especially *Q. ilex* and *Q. suber*, pileus 30-65-(90) mm, dry and velutinous, margin scarcely sulcate and only when mature, odour fruity belated, never of *Pelargonium*, spore print IVb, spores broadly obovoid, with larger and blunter warts than in *R. odorata*, epicutis including hairs 3-5-(7) µm wide and dermatocystidia with no more than 0-1-(3) septa ..... ***R. parodorata***

8b Species with pileus red all over and spore print about IIIc-IVa, context with a fruity/*Pelargonium*-like odour, almost unreacting to $FeSO_4$ (in Subsect. *Rhodellinae*) ..... ***R. arpalices***

8c Cuticle humid and shiny, dermatocystidia with fairly to very numerous septa **9**

9a Species associated with various genera of broadleafed trees, pileus multicoloured, exceptionally pure red ("var. *rutilans*"), 20-50-(60) mm across, margin early sulcate, spore print IVc, spores 6,7-8,5 × 5,7-7 µm, epicutis including hairs very thin and dermatocystidia pluriseptate, unencrusted, 5-8 µm wide ..... ***R. odorata***

9b Tiny and almost membranous species with mauve-pink pileus, odour not distinctive, spore print IVa-b, spores subglobose with larger flat warts, epicutis including relatively bulky hairs and multiseptate dermatocystidia ..... ***R. lilacinicolor***

9c Western species commonly found in certain ruderal or urban areas of the French Atlantic coast under *Quercus* ilex and *Q. suber* on sandy soil, pileus 40-80 mm across, more fleshy and belatedly sulcate than in *R. odorata*, stipe more cylindrical and smoother, spores relatively oblong, 8-9 × 6,5-7,5 µm, dermatocystidia multiseptate (encrustations visible only adopting the proper procedure) ..... ***R. suberetorum***

10a Unconfirmed species with habit thick-set and fleshy like in the previous species, pileus 30-70 mm across, odour strong, partly fruity and metallic, epicutis including dermatocystidia dispersed, multiseptate, having short or subisodiametrical articles, 6-12-(17) µm wide (encrustations visible only adopting the proper procedure) ..... ***R. pseudosuberetorum***

10b Very rare species close to the previous one, from which it would differ in the spore print IVe, the dermatocystidia not wider than 6-8 µm, with only fairly numerous septa and the absolutely odourless context ..... ***R. laricinoaffinis***

11a Species with chamois-fulvous colouring known only from the type locality in Scotland, context little changing, spore print ochraceous, about IIIb, spores reticulate-connected ..... ***R. scotica***

11b Unconfirmed species growing among *Dryas* in the arctic-alpine zone, pileus red brown to violaceous, context not yellowing, spore print somewhere between cream and ochre, spores 9-11,5 × 8-9,5 µm, with isolated warts, basidia remarkably 2-spored, dermatocystidia only 3-5 µm wide (cfr. *R. saliceticola* with 4-spored basidia and large dermatocystidia, growing among *Salix* in swampy siliceous soil) ..... ***R. heterochroa***

NOTE: The *R. minutalis* Britzelm. in the key is meant in Singer's presumed sense according to Romagnesi (1967), a conception shared by numerous Authors before and after "Russules d'Europe". However, if confirmed, the species would be in need of a name change, because Britzelmayr's taxon (1885) is a different species, possibly contaxic with *R. risigallina* (fide Bresinsky, Stangl & Einhell.).

Subsez. ***RHODELLINAE*** (Romagnesi 1962, Bull. Soc. Linn. Ly.: 172) Bon 1986, Doc. Myc., 65: 54.

Diagnosi originale

Pileo ± rubro vel aurantiaco. Carne et stipite parum colore mutante, nunquam maxime flavescente. - Typus: R. rhodella *Gilb.*

Typus (originale): *R. rhodella* Gilbert

Cappello rosso, rosso rame, rosso-arancio, al più toccato di porpora, carne virante solo debolmente al giallo-bruno, tuttavia almeno in un caso nettamente ingiallente (*R. arpalices*), sporata crema, ocra o gialla. Spore piccole, 6,5-8 (9) × 6-7 (7,5) µm, basidi che non oltrepassano 50 × 12 µm, habitat di regola sotto latifoglie.

KEY TO THE SPECIES OF SUBSECTION RHODELLINAE

1a Species with a dry, opaque pileus, sometimes even velutinous, spore print ochre or yellow **2**

1b Pileal surface more or less humid and shiny **5**

2a Species with a yellow spore print, about IVb **4**

2b Tiny species with pileus 20-30-(40) mm across, spore print deep ochre, IIIb to IIIc, exceptionally IVa **3**

3a Species with a velutinous and finely cracked pileus, spore print ochre (IIIb), spores having isolated warts, epicutis with large, short-celled hairs, sitting on an almost pseudoparenchymatous layer made up of sphaerocyst- or amoeba-like articles ..... ***R. melzeri***

3b Very rare species growing under oaks (ecology to be confirmed on a wider number of collections), spore print deep ochre about IIIc (IVa), spores verrucose-cristate, 6,4-8,8 × 5,6-7,5 µm, the ornamentation 0,4-0,6 µm high, epicutis hairs with a variable number of articles, partly subulate, sitting on a layer of ampullaceous hyphae, dermatocystidia with a variable number of septa but also aseptate, 5-8-10-(12) µm wide, a few strangulated or imbued with a golden-yellow juice. ..... ***R. convivialis***

4a Species associated with holm or cork oaks on siliceous soil, especially on sand, pileus velutinous, pinkish to red, with possible shades of brown or carmine, context hardly changing, odourless, epicutis with large, articulated hairs, sitting on ampullaceous hyphae, spores subreticulate, markedly cristate ..... ***R. pseudoimpolita***

4b Species growing under broadleafed trees, mostly deciduous oaks, pileal surface opaque and more or less shagreened but not velutinous, red pink, at most with faint copper orange shades, odour faint of fruit, spores with isolated warts, dermatocystidia finely encrusted ..... ***R. impolita***

5a Species from birch woods, pileus bright red, copper red or partly yellow, stipe often flushed red, hairs of the common type ..... ***R. font-queri***

5b Not with the above combination of characters, species from cool deciduous woods, especially beeches, stipe usually white **6**

6a Context quite yellowing but not all over and reacting normally to $FeSO_4$, spore print cream or ochre **7**

6b Context strongly turning yellow on exposure and hardly reacting to $FeSO_4$, pileus more or less shiny, copper red to brown red, or fading to carmine pink, odour sometimes noteworthy of fruit or *Pelargonium*, spore print about IIIc (cfr. *R. fluxicolor*, with undistinctive odour and slightly positive reaction to $FeSO_4$) ..... ***R. arpalices***

7a Species with cream spore print (IIb-c), spores small, finely verrucose and cristate, dermatocystidia filamentous, 4-6 µm wide ..... ***R. puellula***

7b Species with ochre spore print, not less than IIIa o IIIb, sporal warts more or less isolated, distinctly larger (at least partly reticulate in its var. *heterosperma*) ..... ***R. rhodella***

Subsez. ***BETULINAE*** (Romagnesi 1962, Bull. Soc. Linn. Ly.: 172-173) Sarnari, stat. nov.

Diagnosi originale

Carne et stipite paulum modo flavescente. Pileo violaceo, purpureo, vinoso vel olivaceo. Stipite saepe rubro tincto. Sporis paulo majoribus quam apud ceteras Tenellas, *(7,5) 7,7-13 × 6,2-9 µm; basidiis et cystidiis majoribus quoque (35-60 × 11-13 µm et 50-90 × 8,5-13,5 µm). - Typus:* R. nitida *Fr. ss. J. Schaef. (=* venosa *Vel. ss. Melz.).*

Typus (originale): *R. nitida* (Pers. : Fr.) Fries

Colori molto variabili, gambo tinteggiato volentieri di rosa, sporata crema o ocra, almeno fino a nuovo ordine. Spore e basidi voluminosi, habitat di preferenza sotto betulle. Si tratta di un gruppo di transizione verso le *Sardoninae* della serie *Exalbicans*.

KEY TO THE SPECIES OF SUBSECTION BETULINAE

1a Spore-print cream, stipe seldom with red colouring **2**

1b Spore print ochre, stipe often red, at times all over **3**

2a Species from swampy areas with birches, poplars or other hygrophilous broadleafed trees, pileus shiny, margin tuberculate-striate, spore print IIb-c, context watery and scarcely changing, taste mild or slightly acrid in immature lamellae ..... ***R. roberti***

2b Species from broadleafed woods growing on dry, siliceous soil, pileus finely velutinous, context more or less changing to grey or yellow according to the degree of humidity in the environment, spores with long, more or less curved spines, subcutis with an ampullate structure ..... ***R. brunneoviolacea***

3a Northern species associated with *Picea* on swampy soil, pileus velutinous, 40-120 mm across, spores partly reticulate (in Subsectio *Integriforminae*) ..... ***R. taigarum***

3b Small species with pileus surface smooth and shiny **4**

4a Sylvan species associated with birches (or other hygrophilous broadleafed trees?), rarely under *Picea*, pileus at times umbonate, carmine red to violaceous purple, possibly partly green or brownish, stipe often with a pink-red flush, spore print IIIb-c, spores large, aculeate, spines isolated or variously connected ..... ***R. nitida***

4b Diminutive species from alpine willow dwarf-bush, collected also under *Betula nana* in boreal countries, pileus often blackish purple, lamellae often with a violaceous red edge, spore print towards IIIa-b, spores more or less reticulate-connected (cfr. *R. heterochroa*, unconfirmed form from *Dryas*, having spores with isolated warts, 2-spored basidia and multiseptate dermatocystidia only 3-5 µm wide) ..... ***R. saliceticola***

Subsez. ***LARICINAE*** (Romagnesi 1962, Bull. Soc. Linn. Ly.: 173) Bon 1986, Doc. Myc., 65: 54, emend.

Diagnosi originale

Sporis flavis. Carne et stipite non vel parum flavescente, saepe potius cinerascente. Sub coniferis arboribus crescunt. - Typus: R. nauseosa *ss. Cke.*

Typus (originale): *R. nauseosa* Fries.

Forme policrome proprie dei boschi di conifere (eccezionalmente anche sotto betulle?), a carne ingrigente, poco cangiante o nettamente ingiallente, sporata da ocra carico a giallo carico, spore 7-11,5 × 6-8,5 µm (tuttavia, nel caso di basidi bisporici, sono ammesse misure correlative fino a 9,5-14 × 8,5-11,5 µm), grossi basidi di 30-60 × 9-15 µm.

KEY TO THE SPECIES OF SUBSECTION LARICINAE

1a Small and colourful species from *Picea* forests, with context changing to rusty ochre, spore print IIIc, spores 8,5-10,5-(11) × 6,7-8,8 µm, echinulate and slightly ridged, epicutis dermatocystidia somewhat multiseptate (cfr. *Puellarinae* with smaller spores) ..... ***R. sapinea***

1b Context almost unchanging to distinctly greying, spore print yellow **2**

2a Northern species associated with *Picea* on calcareous soil, pileus olive green to yellowish, context scarcely changing, spore print IVb, spores very large and echinulate, measuring 10-12-(14) × 8,5-10-(11,5) µm, basidia 2-spored (cfr. *R. olivobrunnea* in Section *Integriforminae*, relatively larger or fleshier, with spore print IVd, spores smaller and basidia 4-spored) ..... ***R. olivina***

2b Basidia 4-spored or a different combination of characters **3**

3a Species from pinewoods on siliceous soil, pileal colours pink to vinaceous, very rarely brownish, green or pale yellow, context little changing, thicker and firmer than in the species below, pileal margin weakly sulcate, taste sometimes subacrid, spores subglobose, mostly reticulate-cristate ..... ***R. cessans***

3b Species more brittle and colourful than the previous one, with a wide distribution under *Picea*, *Abies*, *Larix* and possibly montane pines, spores more oblong and less reticulate 4

4a Small species with brittle context, taste mild or almost mild, spore print about IVb, spores with more or less isolated spines ..... ***R. nauseosa***

4b Critical species whose independence from the previous one does not seem sufficiently proved, pileus often with a broad umbo, context more distinctly greying (?), spore print IVc or IVd, spores slightly smaller with branched ridges, found undeeer coniferous trees (mostly under *Larix*?) ..... ***R. laricina***

SOTTOGENERE INCRUSTATULA

Romagnesi

Romagnesi 1987, Doc. Myc., 69: 39, emend.

Diagnosi originale

*Dermatocystidiis semper absentibus; hyphis primordialibus semper presentibus, atque simul sive epicute specie pseudoparenchimatica, sive laticiferis in cortice stipitis absentibus, sive pilis leviter sursum dilatatis. Sporis albis, cremeis vel flavis, rarissime ochraceis (*R. vinosa*). sapore dulci. - Typus:* R. lilacea *Quél.*

Typus (originale): *R. lilacea* Quélet

CARATTERI GENERALI

Russule con epicutis a ife primordiali, senza dermatocistidi (qualche articolo annerente in SBA, eventualmente, in *R. risigallina* e forme correlate), laticiferi nella corteccia del gambo presenti o assenti. Nelle *Olivaceinae* l'epicutis consta di soli peli. Tuttavia, almeno in *R. alutacea* si ritrovano grosse ife plurisettate, ampiamente aggettanti in superficie, che consideriamo ife primordiali private della capacità di secernere incrostazioni. In nessun caso è prevista la dotazione di un velo.

Sez. LILACEINAE (Melzer & Zvara) Konrad & Joss.

subsez. ***Lilaceinae*** (Melzer & Zvara) J. Schaeffer
serie *Emeticicolor* ad int.
serie *Lilacea* ad int.
subsez. ***Roseinae*** Singer ex Sarnari, emend.

Sez. AMETHYSTINAE Romagnesi, emend.

subsez. ***Amethystinae*** (Romagnesi) Bon
subsez. ***Chamaeleontinae*** Singer
serie *Risigallina* ad int.
subsez. ***Integroidinae*** Romagnesi in Bon
serie *Vinosa* ad int.
serie *Sericatula* ad int.
subsez. ***Olivaceinae*** Singer

Sezione LILACEINAE (Melz. & Zv.) Konr. & Joss.

[Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 68] Konrad & Josserand 1934, Bull. Soc. Mycol. Fr., 49: 269

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Pileo paulatim attenuato, margine membranacea, primum subinvoluta, cute glabra, late secernibili, tenaci, numquam cystidiata; lamellis rotundatis. Sporis in cumulo albis, vel fere albis.

Typus (automatico): *R. lilacea* Quélet

CARATTERI GENERALI

La nostra sezione *Lilaceinae* ha la stessa circoscrizione delle *Incrustatae* leucosporee di Romagnesi 1962. Tali *Incrustatae*, fondate sulla medesima specie tipo, *R. lilacea* Quél., e concepite nel medesimo rango, cadono dunque in sinonimia di *Lilaceinae* (Melzer & Zvara) Konrad & Joss. 1934.

Subsez. LILACEINAE [Melzer & Zvara 1927, Arch. př. výzk. Čech., 17 (4): 68] J. Schaeffer 1933, Ann. Myc., 31 (5-6): 318.

Diagnosi originale (M. Snabl & M. Sarnari converserunt):
Pileo paulatim attenuato, margine membranacea, primum subinvoluta, cute glabra, late secernibili, tenaci, numquam cystidiata; lamellis rotundatis. Sporis in cumulo albis, vel fere albis.

Typus (automatico): *R. lilacea* Quélet

Incrustatula leucosporee di taglia generalmente piccola, carnosità mediocre o moderata, cappello rosso o rosa-arancio in alcune specie, nettamente versicolore in altre. Reazione banale alla Solfovanillina, generalmente debolissima con tintura di Guaiaco, ma talvolta nettamente positiva.

KEY TO THE SPECIES OF SUBSECTION LILACEINAE

1a Pileus pure red, at most with a carmine shade, stipe at times of the same colouring (cfr. the possible red forms of usually multicoloured *Lilaceinae*, at 1b) **2**

1b Pileus colourful, greyish to bluish, or violet, or olive green, plain or variegated **4**

1c Species associated with beeches or chestnuts on siliceous soil, pileus ochre to apricot orange, seldom with a pinkish shade along the margin, at times fading to whitish all over, spores subreticolate, epicutis hairs bulky and somewhat clavate, 3,5-5-(6-8) µm wide, primordial hyphae long, 4,5-6-(7) µm wide ..... ***R. roseoaurantia***

2a Spores subreticulate, finely ornated **3**

2b Species associated with cool broadleafed woods, especially *Fagus*, pileus cherry-red, more or less fading to pink tinges, stipe at times spotted red, spores small with isolated spines, epicutis including cylindraceous hairs and thin primordial hyphae, often tapering ..... ***R. emeticicolor***

3a Pileus and usually also stipe with reddish pink colouring, epicutis including large polymorphous hairs and very thin, tapering or subulate, primordial hyphae, found under broadleafed trees .... ***R. zvarae*** var. ***zvarae***

3b Differing from the previous one (3a) in its diminutive size, pileal colours pastel pink, never bright red, the more or less tapering stipe and the occurrence in holm and cork oak maquis .... ***R. zvarae*** var. ***pusilla***

3c Similar to *R. zvarae*, with identical spores, but pileus covered in showy purple granules and stipe satiny, shiny, epicutis with more or less cylindraceous hairs, including primordial hyphae slightly thicker and weakly tapering (unconfirmed species, known only from the type station in Brittany i.e. ancient Armorica) ..... ***R. armoricana***

4a Epicutis with uncharacteristic cylindraceous hairs **5**

4b Epicutis with bulky, at times clavate hairs **8**

5a Spores with warts or spines mostly isolated **6**

5b Spores to some extent reticulate, fruitbodies usually tiny **7**

6a Species growing in cool broadleafed woods, more often under hornbeams on argillaceous-sandy soil, pileus lilacinous violet to cigar brown, seldom with green yellow shades, stipe often flushed carmine pink, sporal spines more or less high and isolated, epicutis hairs cylindraceous, primordial hyphae long and tapering, 3,5-6 µm wide .... ***R. lilacea*** var. ***lilacea***

6b Very rare and not unequivocally confirmed species having spores with low and isolated warts, epicutis with primordial hyphae not larger than 5 µm, the more typical forms have pileus olivaceous brown, with a carmine marginal zone ..... ***R. lilacea*** var. ***carnicolor***

7a Critical species known for a single fruit body found in a cool deciduous trees forest, habit like a tiny *lilacea* but spores subreticulate and primordial hyphae not tapering ..... ***R. retispora***

7b Kind of tiny *lilacea* associated with mediterranean evergreen oaks, pileus violet to bluish grey or spotted green, stipe more or less flushed bright pink, spores subreticulate, epicutis with uncharacteristic cylindrical hairs ..... ***R. subazurea***

8a Species associated with montane conifers, found along paths on sandy, acid soil, pileus bluish grey, with more or less evident violet to olive green or blackish specklings, epicutis with huge clavate hairs, 4-8-(12) µm wide ..... ***R. azurea***

8b Medium-sized species, critical and unconfirmed, known for a single collection from Scandinavia, pileus ochraceous, more whitish along the margin, context as thickset as in *R. vesca*, staining fuchsia with SV in dried specimens, spore print Ib-IIa, spores measuring 7,2-9,6 × 6,3-7,2 µm, with subisolated warts, epicutis hairs long, tapering and rather sinuate, 3-5,6-(9,3) µm wide, primordial hyphae tapering, 3-5,5-(6,2) µm wide ..... ***R. einhellingeri*** ad inter.

Subsez. ROSEINAE Singer ex Sarnari, subsez. nov. emend.

Diagnosi

Incrustatula *pileo roseo vel rubro, interdum partim aurantiaco, sporis albidis vel subcremeis, carne Gaiaci ope caerulescenti, Sulphovanillinae ope vivide purpurascenti.*

Typus: *R. velutipes* Velenovsky

Incrustatula a sporata bianca, cappello rosa, rosso, o in parte rosso-arancio, con reazione peculiare alla SV, rosso porpora brillante e persistente, pressoché negativa alla tintura di Guaiaco.

KEY TO THE SPECIES OF SUBSECTION ROSEINAE

1a Tiny species from broadleafed woods, with velutinous, finely cracked pileus of a rather monochrome red-pink, context soft and brittle, giving off a strong but short-lived odour of rosemary, subcutis structure distinctly pseudoparenchymatous ..... ***R. minutula***

1b Larger and stouter species with undistinctive odour **2**

2a Very rare species with bright red or purple red pileus, cuticle adnate, opaque at least along the margin, context firm when young (cfr. *Lepidinae*, well separated for the epicutis with true but SV-unsensitive dermatocystidia) ..... ***R. lepidicolor***

2b Pileal surface humid and shiny, colouring on average not as bright, context of the common type regarding consistency **3**

3a Species from broadleafed woods, found also under conifers, usually appearing in Spring and Summer, pileus pink to bright red, seldom with a copper brown or apricot orange shade, stipe bulbous, subcutis structure more or less pseudoparenchymatous ..... ***R. velutipes***

3b Rare, poorly known and still critical species close to *R. velutipes* as to habit and colours, but separated for the filamentous subcutis lacking short or amoeba-like articles ..... ***R. heteroderma***

Sezione AMETHYSTINAE Romagnesi

Romagnesi 1962, Bull. Soc. Linn. Ly.: 172, emend.

Diagnosi originale

Haec species sub coniferis arboribus crescunt. Statura robusta. Sporis albis vel flavis. Cute sicca, velutina vel pruinosa. Pilis epicuticularibus interdum clavatis. Laticiferis nigrescentibus in cortice stipitis carentibus. Hyphis primordialibus crassissimis. - Typus: R. amethystina *Quél.*

Typus (originale): *R. amethystina* Quélet

CARATTERI GENERALI

Incrustatula caratterizzate da sporata gialla, raramente ocra, con epicutis a ife primordiali incrostate, solo per eccezione a parete liscia (subsez. *Olivaceinae*). - Mentre le *Amethystinae* di Romagnesi 1962 si identificano con l'omonima sottosezione di Bon appresso considerata, la nostra sezione *Amethystinae* include, oltre alle *Chamaeleontinae*, le stesse *Integroidinae* ed *Olivaceinae*.

Subsez. ***AMETHYSTINAE*** (Romagnesi 1962, Bull. Soc. Linn. Ly.: 172) Bon 1986, Doc. Myc., 65: 53.

Diagnosi originale

Haec species sub coniferis arboribus crescunt. Statura robusta. Sporis albis vel flavis. Cute sicca, velutina vel pruinosa. Pilis epicuticularibus interdum clavatis. Laticiferis nigrescentibus in cortice stipitis carentibus. Hyphis primordialibus crassissimis. - Typus: R. amethystina *Quél.*

Typus: (originale) *R. amethystina* Quélet

Incrustatula di conifere a statura media o relativamente piccola, sporata gialla, superficie pileica vellutata o granulosa, corteccia del gambo senza laticiferi annerenti in SBA.

KEY TO THE SPECIES OF SUBSECTION AMETHYSTINAE

1a Species growing under conifers, especially along paths, on sandy, acid soil, pileus bluish grey, with more or less marked violet shades, to olive green, or partly blackish, epicutis with huge clavate hairs, 4-8-(12) µm wide (in the Subsect. *Lilaceinae*) . ..... ***R. azurea***

1b Spore print deep ochre to yellow **2**

2a Species growing in acid coniferous woods, more frequent under pines and in mountainous places, pileus pure red, orange, or partly yellowish, stipe not unfrequently with a pink flush, context odourless, spores subreticulate ..... ***R. roseipes***

2b Colours different, purple violet to bluish, at times green, brown or partly yellow etc. . **3**

3a Species found in siliceous, more or less sandy coniferous woods, reported also under *Cystus* and *Juniperus* bushes, pileus distinctly multicoloured, lilacinous violet to bluish grey, to vinaceous brown, olive green or entirely yellow, odour iodoform-like at stipe base, spores somewhat reticulate, with rather low nodulose warts ..... ***R. turci***

3b Rarer or mostly montane species associated with *Picea* or silver fir on calcareous soil, spores with more prominent and basically isolated warts, pileus staining bright yellow in the rain, odour iodoform-like faint but generalized ..... ***R. amethystina***

Subsez. CHAMAELEONTINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 236.

Diagnosi originale

Hut 2-7 cm breit. Stiel 6-15 (-18) mm dick, Fleisch gebrechlich oder sehr leicht-weich, ganz mild, ohne die geringste Schärfe. Sporenstaub III. Bau brüchig. Rand stumpf.

Typus (automatico): *R. chamaeleontina* Fries

Incrustatula caratterizzate da peli dell'epicutis cortamente clavati, superficie pileica in generale liscia, non pruinosa né granulosa, sporata gialla.

KEY TO THE SPECIES OF SUBSECTION CHAMAELEONTINAE

1a Spore print deep yellow, towards IVd or IVe 2
1b Spore print light yellow, towards IVa or at most IVb **5**
2a Species with mostly northern distribution, a strong odour of mustard or pickles when rotting, pileus chrome yellow, pileal surface slightly viscid and shiny ..... ***R. vitellina***
2b Odour not distinctive or differently characterized, pileal surface basically duller **3**
3a Species associated with *Picea* or silver fir, pileus green yellow to livid violaceous or partly brownish, lamellae distinctly ventricose, spore print IVd-e, spores large, with more or less isolated spines ..... ***R. olivascens***
3b Not with the above combination of characters **4**
4a Tall and slender species with pileus mostly red or orange, at times partly or even entirely yellow, cuticle opaque, peelable as far as the middle, lamellae tending to be equal, odour reminding that of withered roses in very old fruit-bodies, spores with more or less isolated spines ..... ***R. risigallina***
4b Micromorphological characters as in the species above, but habit relatively thick and fleshy, pileal surface on average shinier, pileus ochre or with a pinkish shade along the margin, odour not distinctive when rotting ..... ***R. ochracea***
4c Species associated with mediterranean evergreen oaks and warm deciduous oak-woods on siliceous soil, pileus golden yellow, up to 90-100 mm across, surface soon dry and opaque, spore print about IVe, spores with warts partly forming catenulae or ridges, epicutis with primordial hyphae very thin, only 3-4 µm wide ..... ***R. helios***
5a Species associated with broadleafed trees, especially *Quercus*, pileus pink to blood or violaceous red, with more or less diffuse copper brown or ochre yellow specklings, stipe flaring at the apex, lamellae ventricose with rounded-free attachment ..... ***R. roseicolor***
5b Pileus yellow all over or with a slight greenish shade, primordial hyphae very large, 6-7-8) µm wide **6**
5c Pileus pale yellow or partly pinkish, stipe base at times pinkish, spores measuring 6,3-8,8 x 5,2-7 µm, warty and partly ridged, epicutis primordial hyphae 2-4,8 µm wide (rare species with "salmon-pink" spore print, known only from north-European beech forests and based on scanty material) ..... ***R. salmonolutea***
6a Unconfirmed species from broadleafed woods (*Fagus*), habit remending that of *R. ochroleuca*, pileus sometimes partly olivaceous, spores with spines and shortly subreticulate-cristate form, epicutis with primordial hyphae 6-8 µm wide ..... ***R. flavocitrina***
6b Critical species with pileus basically yellow, odour faint of mustard, spores with low, partly connected warts, epicutis primordial hyphae 4-7 µm wide ..... ***R. gilva***

Note: The above characterization of *R. gilva* Zvára is in the sense of Romagnesi (1967). However, this species, originally found under *Pinus*, according to J. Schäffer should have primordial hyphae only 3-5 µm wide. Similarly, there are doubts about *R. flavocitrina* J. Blum ex Bon, whose primordial hyphae should measure 4-5 µm according to Blum, while they are 6-8 µm wide in the type designated by Bon (1986).

Subsez. INTEGROIDINAE Romagnesi in Bon 1986, Doc. Myc., 65: 54.

[validazione di Bon per rinvio a "Integroidinae nov. sect." in Romagnesi 1958, Bull. Soc. Lin. Lyon, 27 (9): 287, nom. inval. (assenza di D.L.)].

Diagnosi originale (Romagnesi 1958)
Sporis flavis. Sapore dulci. Cute hyphis primordialibus incrustatis praedita, sine dermatocystidiis laticiferisve. Cortice stipitis multis laticiferis praedito.

Typus (originale): *R. sericatula* Romagnesi

Incrustatula a sporata ocra o gialla, con laticiferi annerenti in SBA nella corteccia del gambo, carne talvolta annerente o un po' ingrigente. La reazione alla SV può ricordare in qualche caso quella delle *Roseinae*.

KEY TO THE SPECIES OF SUBSECTION INTEGROIDINAE

1a Species with mostly or exclusively northern distribution associated with conifers or birches, rarer under hygrophilous broadleafed trees (poplars, alders, dwarf willows), context changing spontaneously to black and staining orange with formalin (**Series *Vinosa***) **2**

1b Species with a more southern distribution, associated with broadleafed or coniferous trees, context little changing or only greying, reaction to formalin weak or negative (**Series *Sericatula***) **5**

2a Pileus purple red to brownish, at most fading to green yellow in the middle **3**

2b Pileus pure yellow or olive green **4**

3a Northern species associated with various *Betula*, pileus especially brown red, sometimes with green yellow spots in the middle and whitish outermost margin, spore print IIIc or IVa, spores with short ridges and low blunt warts ..... ***R. pubescens***

3b Species from mossy coniferous forest with blueberries, growing also under *Betula pubescens* ssp. *czerepanovii* or *Betula nana* in the boreal zone, pileus brown purple, margin violet and outermost margin pale violet, spore print towards IIIa or IIIa-b, sporal spine long and thin ..... ***R. vinosa***

4a Species inhabiting more or less swampy areas with birches, alders or poplars, pileus basically chrome yellow (cfr. *R. seperina* var. *luteovirens*, associated with *Quercus*, especially evergreen oaks) ..... ***R. claroflava***

4b Strictly circumpolar species associated with birches (*Betula pubescens* and *B. nana*), pileus olive green and stipe often clavate, spores with larger size and lower ornamentation than in the previous species, epicutis with primordial hyphae thicker, shortly articulated and in tufts ..... ***R. groenlandica***

5a Species found on naked argillaceous soil under oaks or other broadleafed trees, pileus vermillion, more or less fading, spore print towards IVb, odour strong, a mix of pelargonium and fruit, taste bitterish or partly subacrid, context becomin grey in wet weather, hardly reacting to $FeSO_4$ and gaiac ..... ***R. pseudointegra***

5b Pileal coulours notably variable, context with a different or not distinctive odour, reaction to gaiac generally positive **6**

6a Species growing under hornbeam, absolutely rare under other broadleafed trees, pileus very colourful, hymenophore very regular, lacking lamellulae, context slightly greying in wet weather and slowly turning to green with $FeSO_4$, spores with isolated spines, epicutis with primordial hyphae scattered, short and thin (cfr. *R. melitodes* finally with a honey-like odour and epicutis having a mixed structure) ..... ***R. sericatula***

6b Species found in dry pinewoods on siliceous soil, pileus typically umbonate (character rarely lacking), pileal surface shiny, stipe subfusiform, spore print IVa-b, context little changing, with undistinctive odour and bitter taste, the latter concentrated within the pileal cuticle ..... ***R. caerulea***

Subsez. OLIVACEINAE Singer 1932, Beih. Bot. Centralbl., 49 (2): 242.

Diagnosi originale

Rand stumpf oder gerundet, Hut kaum schuppig aufbrechend. Epicutis mit Flockenhaaren, mit oder - gewöhnlich - ohne Cystiden. Fleisch fast stets mild. Sporenstaub wie bei Subs. III. Hymenialcystiden - soweit untersucht - nie ganz blau in Sulfovanillin.

Typus (automatico): *R. olivacea* (Schaeffer) Persoon

Specie robuste e carnose, di statura media o decisamente grande, sporata gialla, carne che si colora di violetto porpora con il Fenolo e di arancio con il $FeSO_4$. L'epicutis contiene "ife primordiali non incrostate" grosse e plurisettate, tuttavia non sempre morfologicamente ben caratterizzate. Corteccia del gambo senza articoli annerenti in SBA.

KEY TO THE SPECIES OF SUBSECTION OLIVACEINAE

1a Large-sized species growing in beech forests, absolutely rarer under *Picea*, pileal cuticle projecting beyond the lamellae, velutinous and concentrically marbled in the typical forms, stipe often at least partly pastel pink, the pigmented area tending to withdraw and become a narrow belt close to the lamellae, spores about 8,5-11,2 × 8-9,2 µm, but microsporal forms are not larger than 9,8 × 8,3, the ornamentation consisting of more or less isolated spines, epicutis with hairs distinctly bulky, formed by short, ampullaceous cells ..... ***R. olivacea***

1b Not with the above association of characters, habit on average smaller or ecology different, epicutis with hairs narrower **2**

2a Medium-sized species growing under broadleafed trees on calcareous soil, cuticle more or less smooth, lacking concentrical marbling, stipe white or with a pink flush in the lower portion, wide spores measuring 8,8-11,2 × 7,4-9,5 µm (but microsporal form are possible), distictly cristate-reticulate in the typical forms, accidentally with mostly isolated warts, nevertheless the latter are lower and more rounded than in the following species, reaction to phenol relatively weak ..... ***R. alutacea***

2b Medium-sized species from broadleafed woods, pileal surface opaque, more or less rough and marbled, stipe often flushed pink over most of its extent, spores 7,3-10 × 6,4-8 µm, with spines projecting 0,8-1-(1,2) µm and ridges more or less numerous and branched ..... ***R. vinosobrunnea*** var. ***vinosobrunnea***

2c Mediterranean findings under oaks, close to the preceding one as to macroscopical features, but with spore more bulky, reaching 8-12 × 6,7-9,6 µm, the aculeous partly linked by short chains, ridges, or a few connections ..... ***R. vinosobrunnea*** var. ***perplexa***