

In: Biology, systematics and ecology of fungi in natural and agricultural ecosystems.
Proceedings of the International Scientific Conference (Minsk, September 20–24, 2004) /
Editors-compilers: E.O. Yurchenko, O.S. Gapienko. – Minsk: Pravo i ekonomika, 2004.
P. 304–310.

CORTICIOID FUNGI ASSOCIATED WITH APPLE-TREE IN BELARUS:
RESULTS OF 12-YEARS INVESTIGATION

E.O. Yurchenko

Laboratory of Mycology, V.F. Kuprevich Institute of Experimental Botany,
Akademichnaya str. 27, BY-220072, Minsk, Belarus
E-mail: fungi@biobel.bas-net.by

The object of the research were resupinate non-poroid homobasidiomycetes united in an artificial family Corticiaceae s. l., more correctly called corticioid fungi, associated with species of the genus *Malus* Mill. In Belarus the genus includes 5 true and hybridogeneous species registered in cultivated, natural and semi-wild state. In the last case plants easily develop from occasional propagules, including in habitats out of plantations, but commonly not form true populations. The single aboriginal species is *Malus sylvestris* Mill. (incl. *M. praecox* (Pall.) Borkh.) [*M. sylvestris* (L.) Mill.],* using also in culture as stock. In the same time *M. domestica* Borkh. [Gr. cult. *Domesticae* Langenf. seu *M. domestica* Borkh. s. l.], *M. prunifolia* (Willd.) Borkh. [*Malus* Gr. \times *Prunifoliae* (Juz.) Langenf. seu *M. \times prunifolia* (Willd.) Borkh.], *M. baccata* (L.) Borkh., *M. totingo* Siebold (and the hybrids between these species) go into wild state from culture.

The main theoretical question forestalling the research was how many species of corticioid fungi can inhabit a vascular plant genus and a separate plant individual. Thus the aim of the work was to make maximum full inventory of corticioid fungi associated with a sample vascular plant genus and simultaneously to make an inventory of garden-inhabiting corticioid fungi on cultivated *Malus*.

The work included author's collections and field observations in period 1 Nov 1992 – 5 Jun 1999 and the prolonged time of subsequent specimens identification. Collection sites scheme are shown on Fig. 1. Under *collection site* in this article we imply a populated area (village, settlement, town) and its outskirts.** Some corticioid fungi on *Malus* spp. were reported by us earlier, 12 species (Yurchenko, 1995), 22 species (1998a), 3 species (1998b), 12 species (2000a), 2 species (2000b), 2 species (2001) and 1 species in Yurchenko and Zmitrovich (2001).

Reference specimens are kept in V.F. Kuprevich Institute of Experimental Botany Herbarium, section 'Fungi' (MSK-F). Some specimens were duplicated and sent to GB, KRAM-F, LE and TAA herbaria.

Fungi nomenclature is following CORTBASE vers. 1.4, 2002 (Parmasto, 1997), except two correct names accepted by us and differing from CORTBASE data (see list of species).

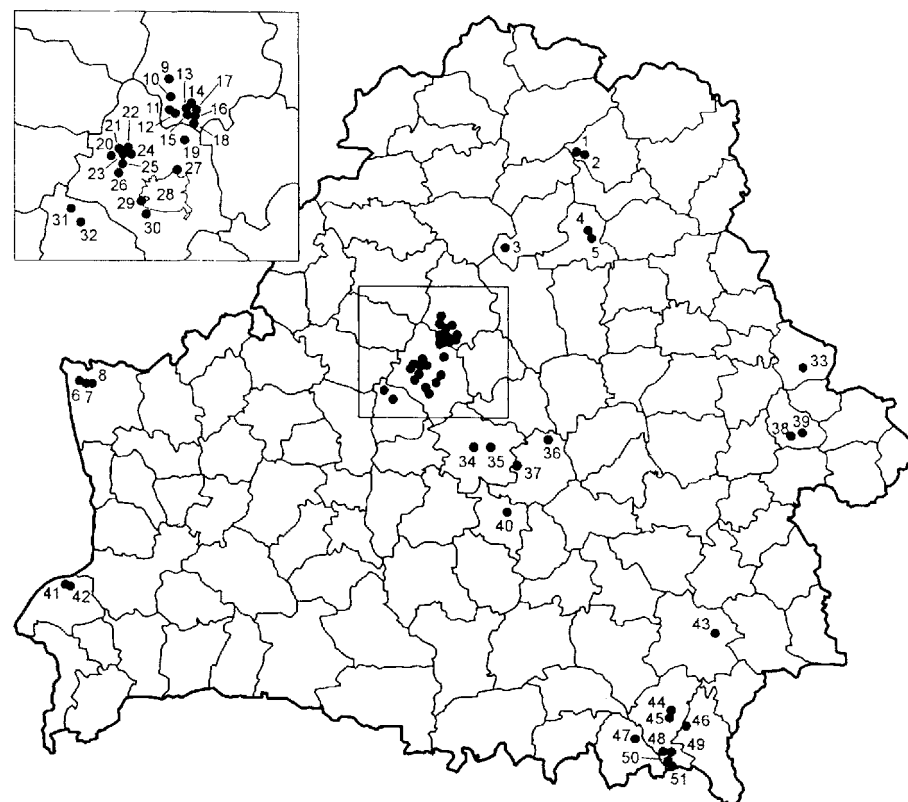


Fig. 1. Collection sites scheme (with borders of administrative districts). Sites numbering: 1 – Shashy, 2 – Padlesse, 3 – Domzharytsy, 4 – Baravya, 5 – Kruhlytsa, 6 – Sonichy, 7 – Astasha, 8 – Yatsvez', 9 – Saudzenevichy, 10 – Prudzishcha, 11 – Prysylki, 12 – Dubnitsa, 13 – Krapuzhyna, 14 – Kandratavichy, 15 – Litsvinkava, 16 – Astroshytsy, 17 – Moshchanka, 18 – Zykava, 19 – Astrashytski Haradok, 20 – Zaslaue, 21 – Dzekhnauka, 22 – Syalets, 23 – Zahor'e, 24 – Laparavichy, 25 – Hanales, 26 – Kryzhouka, 27 – Baravya, 28 – Minsk, 29 – Sukharava, 30 – Shchomyslitsa, 31 – Skimantava, 32 – Putchyna and Nasledniki, 33 – Khodasy and former Zyalonaya Dubrova, 34 – Shymanau Kut, 35 – Mar'ina Horka, 36 – Hradzyanka, 37 – Tsel', 38 – Limen', 39 – Vepryn, 40 – Falichy, 41 – Valikae Selishcha and former Plyanta and Yelinski Bor), 42 – Kamyanyuki, 43 – Kapan', 44 – Stralichau, 45 – Babchyn, 46 – Vyazok, 47 – Tsheshkau, 48 – Aravichy, 49 – Pahonnae, 50 – Barshchouka, 51 – Masany.

The fungi distribution in apple-tree consortium topographical data (based on original observations) were classified in several position types in respect to host organs, depending of three main factors – substrate condition (living, dying, dead), situation above the ground surface (at a distance from ground, close to ground or in contact with ground) and substratum diameter (Fig. 2). The classification was used in herbarium labels for describing the substrata. Some substratum types were colonized by corticioid fungi in exceptional cases, e.g. *Athelia arachnoidea* on fallen immature fruit.

* *Malus* species nomenclature is following Czerepanov (1995) with names proposed by Langenfelds (1991) in square brackets.

** The names of populated areas are given in accordance with official Belarusian spelling (Rapanovich, 1977–1986) in English transliteration.

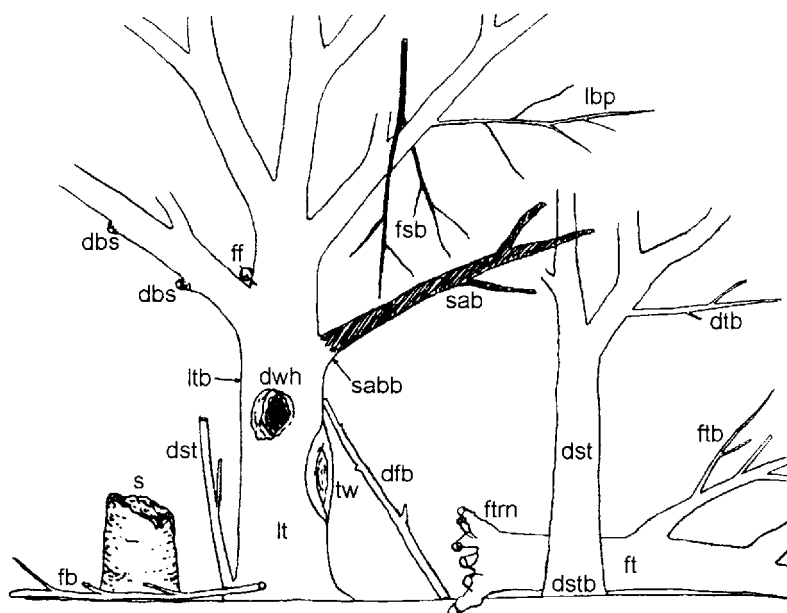


Fig. 2. Topographical positions of fungi inhabiting apple-tree. Abbreviations: **dbs** — stumps of former dead branches, **dfb** — declined fallen branches and trunks, **dst** — dead standing trunks, **dstb** — dead standing trunks base or root neck, **dtb** — dead standing trees branches, **dwh** — dead wood in trunk hollows, **fb** — fallen branches, **ff** — fallen fruits, not on ground, **fsb** — fallen suspended branches, **ft** — fallen trunks, **ftb** — fallen and cut tree branches, **ftrn** — fallen and uprooted trees root neck, **lbp** — living branches periderm, **lt** — living trunks (inside) — for true parasites, **ltb** — living trunks, on bark tissue, **s** — stumps, **sab** — dead still-attached branches, **sabb** — dead still-attached branches base, transition into living portion of tree, **tw** — trunk wounds and ulcers; patches of trunk dead wood of different genesis (equal to the Russian word 'sukhobochiny').

Altogether 326 specimens were examined and 54 species identified.

List of species

Species names in the list are accompanied by the information fields: host species / positions (abbreviations see Fig. 2) / collection sites numbers / reference specimens numbers. The names marked by an asterisk (*) are published for the first time for Belarus.

1. *Athelia arachnoidea* (Berk.) Jülich; this species on *Malus* ssp. was discussed in Yurchenko & Golubkov (2003) with data on all specimens examined.
2. *Athelia epiphylla* complex / *M. domestica* / fb / 3 / MSK 4023.
3. *Basidiaradulum radula* (Fr.) Nobles / *M. sylvestris* / s, sab / 16, 30, 35 / MSK 5460, 5542, 5582.
4. *Brevicellicium olivascens* (Bres.) K.H. Larss. & Hjortstam / *M. domestica*, *M. sylvestris*, *Malus* sp. / sab / 15, 20, 42, 43, 50 / MSK 4957, 4959, 4960, 4961a, 4961b.
5. *Byssomerulius corium* (Pers.) Parmasto / *M. domestica*, *M. sylvestris* / fb, sab / 15, 33, 41, 42 / MSK 4668, 5112, 5113, 5465.

6. *Chondrostereum purpureum* (Pers.) Pouzar / *M. domestica* / dst, lt / 28 / MSK 5174, 5185, 5186.

7. *Corticium roseum* Pers. / *M. domestica* / fb, sab / 3, 33 / MSK 4136, 4432.

8. *Cylindrobasidium evolvens* (Fr.) Jülich / *M. domestica*, *M. sylvestris* / dbs, sab, tw / 3, 20, 26, 28, 29, 30, 45 / MSK 4018, 4027, 4028, 5352–5356, 5358, 5363–5365.

9. *Dendrophora versiformis* (Berk. & M.A. Curtis) Chamuris / *Malus* sp. / sab / 51 / MSK 4595.

10. **Dendrothele* aff. *commixta* (Höhn. & Litsch.) J. Erikss. & Ryvarden / *M. domestica*, *M. sylvestris* / fb, sab / 15, 21, 30, 41 / MSK 5232, 5556, 5559, 5561, 5587. The specimens examined have scattered unbranched or poorly branched hyphidia, basidia 22–24 × 6.5–7.5 μm (in MSK 5561 with abnormal lateral sterigmata-like outgrowths) and spores 6–10.5 (11.5) × 4.5–5.5 (6) μm.

11. *Gloeocystidiellum leucoxanthum* (Bres.) Boidin / *M. domestica* / sab / 1, 3, 33, 38, 41 / MSK 4017, 5030, 5475–5480.

12. *Gloeocystidiellum porosum* (Berk. & M.A. Curtis) Donk / *M. domestica*, *M. sylvestris* / sab / 8, 15, 17 / MSK 4676, 4688, 4690.

13. *Hymenochaete tabacina* (Sowerby) Lév. / *M. domestica*, *M. sylvestris* / sab / 1, 4, 10, 28, 30, 41, 42 / MSK 5187–5189, 5195, 5199, 5205, 5206, 5208.

14. *Hyphoderma* aff. *argillaceum* (Bres.) Donk / fb (in forest litter, strongly decayed) / *M. sylvestris* / 17 / MSK 5536. The specimen has projecting tapering (fusoid) cystidia commonly bearing brown excretion halo at rounded tip, 38–60 × 5.5–9 μm; basidia 14.5–23 × 4.5–5 μm; spores 6–7 × 2.5–3.7 μm.

15. *Hyphoderma medioburiense* (Burt) Donk / *M. domestica* / sab / 33 / MSK 5454.

16. *Hyphoderma mutatum* (Peck) Donk / *M. domestica* / sabb (fruitbody coming on living trunk bark) / 45 / MSK 4089.

17. *Hyphoderma praetermissum* complex / *M. domestica*, *M. sylvestris* / dst, sab / 11, 45 / MSK 5446, 5447.

18. *Hyphoderma setigerum* (Fr.) Donk / *M. domestica*, *M. sylvestris* / dst, sab / 15, 17, 30, 34, 41, 43, 48 / MSK 4975, 4980, 4983, 4984, 4985, 4986, 5589.

19. *Hyphodontia breviseta* / *M. sylvestris* / sab / 23 / MSK 6401.

20. *Hyphodontia crustosa* (Pers.) J. Erikss. / *M. domestica*, *M. sylvestris*, *Malus* sp. / dst, dtb, ft, sab / 1, 12, 15, 17, 23, 41 / MSK 5517, 5534, 5535, 5539, 5540, 5541, 5544, 5549, 5550, 5573, 5588.

21. *Hyphodontia nesporei* (Bres.) J. Erikss. & Hjortstam / *M. sylvestris* / sab / 15 / MSK 5537.

22. *Hyphodontia paradoxa* (Schrad.) E. Langer & Vesterh. / *M. sylvestris* / sab / 15, 23 / MSK 5515, 5545.

23. *Hyphodontia pruni* (Lasch) Svrček / *Malus* cf. *sylvestris* / sab / 35 / MSK 5548.

24. *Hyphodontia quercina* (Pers.) J. Erikss. / *M. domestica*, *M. sylvestris*, *M. domestica* × *prunifolia* / fb, sab / 13, 15, 17, 30 / MSK 5445, 5519, 5521, 5525, 5528, 5538, 5543.

25. *Hyphodontia radula* (Pers.) E. Langer & Vesterh. (*Schizopora radula* (Pers.) Hallenb. as name in current use following CORTBASE) / *M. sylvestris* / fb, fsb / 11, 23 / MSK 5523, 5526.

26. *Hyphodontia rimosissima* (Peck) Gilb. / dfb, dst, sab / 11, 17, 20, 31 / MSK 4442, 4447, 5210, 5546.

27. *Hyphodontia sambuci* (Pers.) J. Erikss. / *M. domestica*, *M. sylvestris* / frn, sab / 3, 30 / MSK 4703, 5532.

28. *Hypochnicium bombycinum* (Sommerf.) J. Erikss. / *M. sylvestris* / ltb (incl. near dbs), tw / 30 / MSK 5132–5136, 5138, 5144.

29. *Irpex lacteus* (Fr.) Fr. / *M. domestica*, *Malus* sp. / sab / 45, 48, 51 / MSK 5482, 5486, 5487.

30. *Peniophora cinerea* (Pers.) Cooke / *M. domestica*, *M. domestica*×*prunifolia*, *M. prunifolia*, *M. sylvestris*, *M. cf. sylvestris*, *Malus* sp. / dst, fb, sab / 1–8, 11, 13–16, 18, 21, 22, 24, 26–30, 32, 33, 36, 37, 40–45, 51 / MSK 4019, 4024, 4147, 4423, 4629, 4650–4653, 4967, 5145–5172, 5229, 5245, 5248, 5289–5315, 5380, 5426, 5473.

31. *Peniophora incarnata* complex / *M. baccata*×*toringo*, *M. domestica*, *M. domestica*×*prunifolia*, *M. sylvestris*, *M. cf. prunifolia* / dbs, s, sab, tw / 1, 3, 4, 7, 11, 14–16, 25, 27–30, 41, 42 / / MSK 4029–4031, 4422, 4555, 4596, 4598, 4601–4603, 4605, 4607, 4612–4617, 4620–4629.

32. *Peniophora nuda* (Fr.) Bres. / *M. domestica* / sab / 45, 51 / MSK 4592, 4593.

33. *Phanerochaete cremeo-ochracea* (Bourdot & Galzin) Hjortstam / *M. sylvestris* / sab / 21 / MSK 5120.

34. *Phanerochaete cf. laevis* (Pers.) J. Erikss. / *M. sylvestris* / sab / 23 / MSK 6402. The basidioma is immature and lacked spores, cystidia were not found, but the subicular hyphae are narrower and of rather close package than in *Ph. sordida*, that permits to determine the specimen as close to *Ph. laevis*.

35. *Phanerochaete sordida* (P. Karst.) J. Erikss. & Ryvarden / *M. domestica*, *Malus* sp. / ft, sab / 3, 41 / MSK 4141, 5492.

36. *Phlebia centrifuga* P. Karst. / *M. domestica* / dtb / 3 / MSK 4143.

37. *Phlebia radiata* Fr. / *M. domestica* / sab (very thick) / 1 / MSK 5115.

38. *Phlebia rufa* (Pers.) M.P. Christ. / *M. domestica* / sab / 51 / MSK 5119.

39. *Phlebia tremellosa* (Schrad.) Nakasone & Burds. / *M. domestica* / dst, dwh, frn, s, sab (very thick) / 1, 3, 26 / MSK 4025, 4698, 5110, 5111.

40. **Phlebiella allantospora* (Oberw.) K.H. Larss. & Hjortstam / *M. domestica* / sab / 50 / MSK 5234.

41. *Radulomyces confluens* (Fr.) M.P. Christ. / *M. domestica*, *M. domestica*×*prunifolia*, *M. prunifolia*, *M. sylvestris* / fb, s, sab / 8, 14, 15, 17, 26, 29, 30, 45, 51 / MSK 4209, 5249, 5251, 5257, 5259, 5261, 5263, 5264, 5270–5272, 5276–5278, 5280, 5281, 5284, 5379, 5443, 5577, 5584.

42. *Radulomyces molaris* (Chaillat) M.P. Christ. / *M. prunifolia* / sab / 43 / MSK 4609.

43. *Sarcodontia crocea* (Schwein.) Kotl. / *M. domestica*, *M. sylvestris* / ft (!saprobic – possibly the basidioma has preserved after tree dying and falling), lt / 16, 39 / MSK 4669, 5502.

44. *Sistotrema brinkmannii* (Bres.) J. Erikss. / *M. domestica*, *M. sylvestris*, *M. domestica*×*prunifolia* / dtb, fsb, sab, dying trunk bark / 4, 20, 21, 26, 28–30, 41, 44, 45, 49 / MSK 4420, 4424, 4425, 5213–5218, 5220, 5221, 5224–5226, 5228, 5230, 5233, 5238, 5241, 5243, 5245–5247, 5307.

45. *Sistotrema oblongisporum* M.P. Christ. & Hauerslev. / *M. domestica*, *M. sylvestris* / fsb, sab / 3, 11, 15, 26, 28, 46 / MSK 4026, 4205, 4377, 5229, 5242, 5244, 5576.

46. *Sistotremastrum niveocreum* (Höhn. et Litsch.) J. Erikss. ('*Sistotrema niveocreum* (Höhn. et Litsch.) J. Erikss.' as correct name in CORTBASE) / *M. domestica* / dst, sab / 19, 42 / MSK 4659, 5248, 5583.

47. *Stereum hirsutum* (Willd.) Gray / *M. domestica*, *M. sylvestris*, *M. prunifolia* / dst, s, sab / 1, 15, 17, 21, 28, 37, 41–43 / MSK 4334, 5078, 5083, 5090, 5091, 5095, 5097, 5100, 5101, 5342.

48. *Stereum rugosum* (Pers.) Fr. / *M. domestica*, *M. sylvestris* / dst, ltb, s, sab / 9, 11, 15, 17, 21, 23, 30, 42 / MSK 5327, 5328, 5330, 5331, 5334, 5336–5339, 5341, 5343, 5344.

49. *Tomentella atramentaria* Rostr. / *M. sylvestris* / fb (immersed in forest litter) / 17 / MSK 5432.

50. *Trechispora subsphaerospora* (Litsch.) Liberta / *M. sylvestris* / partly living trunk strongly decayed bark piece / 11 / MSK 5227. The specimen has rounded-triangular spores 2.5–3 × 2–2.5 µm, slightly elongated towards apiculus and with scarce warts in apical part.

51. *Tubulicrinis glebulosus* (Fr.) Donk / *M. sylvestris* / dst, sab / 10, 22 / MSK 5211, 5212.

52. *Uthatabasidium fusisporum* (J. Schröt.) Donk / *Malus prunifolia* / s / 30 / MSK 5558.

53. *Vuilleminia comedens* (Nees) Maire / *M. domestica*, *M. sylvestris* / dst, fb, sab / 15, 23, 30, 41 / MSK 4689, 5128–5131.

54. **Vuilleminia coryli* Boidin, Lanquetin & Gilles / *M. domestica* / fb / 3 / MSK 4156. The basidioma is immature and without spores, but very scarce cylindrical or slightly fusoid protruding cystidia 6.5–7.5 µm wide, with weakly thickened wall present in the specimen.

The frequency of species on *Malus* were quite different, which is partly reflected by the number of specimens collected. The highest numbers belong to *Peniophora cinerea*, occurring as the most common and abundant colonizer of still-attached branches (71 specimens), *Athelia arachnoidea* (39; Yurchenko, Golubkov, 2003), *Peniophora incarnata* complex (28), *Sistotrema brinkmannii* (24), *Radulomyces confluens* (21), *Cylindrobasidium evolvens* (12), *Stereum rugosum* (12), *Hyphodontia crustosa* (11), *Stereum hirsutum* (10). Dead still-attached branches are the main type of substratum – they are colonized by 40 species (74% of total number); 12 species (22%) were collected on dead standing trunks of different diameter, including outgrowths near main trunk, and only 11 (20%) on fallen branches in contact with ground. In all 37 species were recorded on *M. domestica*, 33 on *M. sylvestris*, 5 on *M. prunifolia*.

Up to 6 species were recorded per single tree, i.e. in an individual consortium. E.g. *Hyphodontia quercina*, *Peniophora cinerea*, *P. incarnata*, *Sistotrema brinkmannii* and *Radulomyces confluens* were observed on dead still-attached branches of old *M. domestica*×*prunifolia* in site 15; *Cylindrobasidium evolvens*, *Hyphodontia sambuci*, *Hypochnicium bombycinum*, *Peniophora cinerea*, *P. incarnata* and *Radulomyces confluens* were collected on rather old *M. sylvestris* in site 30.

Some fructifications were observed on big height on still-attached dead twigs in crown, e.g. *Gloeocystidiellum porosum* (MSK 4676) – 9.3 m and *Schizopora paradoxa* (MSK 5545) – 9.5 m above the ground.

Only two (4%) species were recorded as clear parasitizing *M. domestica*: *Chondrostereum purpureum* and *Sarcodontia crocea*. Several species were of unclear type of

type of nutrition, with basidiomata occurring close to living host tissues – in trunk wounds (*Cylindrobasidium evolvens*, *Hypochnicium bombycinum*, *Periophora incamata*) and on bark of living or partly dead trunks (*Hyphoderma mutatum*, *Hypochnicium bombycinum*, *Sistotrema brinkmannii*, *Stereum rugosum*).

Literature

- Czerepanov S.K. *Plantae vasculares Rossicae et civitatum collimitaneorum* (in limicis URSS olim). S. Petropolis: Mir i Semia-95, 1995. 991 p. (in Russian)
- Langenfelds V. Apple-tree: morphological evolution, phylogeny, geography, systematics. Riga: Zinātne, 1991. 235 p. (in Russian with English summary)
- Parmasto E. CORTBASE – a nomenclatural taxabase of corticioid fungi (Hymenomycetes) // *Mycotaxon*. 1997. Vol. 61. P. 467–471.
(<http://www2.botany.gu.se/database/cortbase/cortbase.html>)
- Rapanovich Ya.N. [Brest, Homel', Hrodna, Mahilyou, Minsk, Vitsebsk voblasts' populated areas names dictionary] / Ed. P.P. Shuba. Minsk: Navuka i tekhnika, 1977–1986. (in Belarusian)
- Yurchenko E.O. [Corticioid fungi (Corticiaceae s.l.) on apple-tree in Belarus]. In: [Collection of student science articles of the 52nd Student Science Conference in Belarus State University, Minsk, April–May, 1995.] Minsk: Belarus State Univ., 1995. P. 51–53. (in Russian)
- Yurchenko E.O. New and rare corticioid fungi (Corticiaceae s. l.) of Belarus in consortia of genus *Malus* Mill. // *Bulletin of Belarus State University*. 1998a. No. 1. P. 31–25. (in Russian with short English summary)
- Yurchenko E.O. The new for Belarus species of corticioid fungi (Basidiomycetes) // *Ukr. Bot. Journ.* 1998b. Vol. 55. No. 5. P. 509–512. (in Russian with English and Ukrainian summary)
- Yurchenko E.O. Consortive bonds of corticioid fungi (Basidiomycetes) with vascular plants (*Plantae vasculares*) of Berezina Biospheric Reserve // *Proceedings of the National Academy of Sciences of Belarus (Vestsi Natsiyanalnai Akademii Navuk Belarusi)*. Series of Biological Sciences. 2000a. No. 1. P. 22–24. (in Russian with short English summary)
- Yurchenko E.O. Key to the genus *Periophora* (Corticiaceae s. l., Basidiomycetes) of Belorussia // *Mycology and Phytopathology (Mikol. Fitopatol.)*. 2000b. Vol. 34. Issue 5. P. 37–41.
- Yurchenko E.O. Corticioid fungi on mosses in Belarus // *Mycena*. 2001. Vol. 1. No. 1. P. 71–91. ([http://www.mycena.org/Vol.1,No.1/Mycena1\(1\)_71-91.pdf](http://www.mycena.org/Vol.1,No.1/Mycena1(1)_71-91.pdf))
- Yurchenko E.O., Zmitrovich I.V. Variability of *Hyphoderma setigerum* (Corticiaceae s.l., Basidiomycetes) in Belarus and northwest Russia // *Mycotaxon*. 2001. Vol. 78. P. 423–434.
- Yurchenko E.O., Golubkov V.V. The morphology, biology, and geography of a necrotrophic basidiomycete *Athelia arachnoidea* in Belarus // *Mycological Progress*. 2003. Vol. 2. No. 4. P. 275–284.