


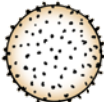













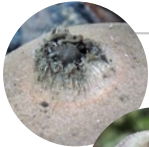

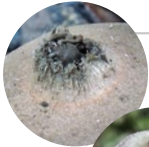









Key to star-shaped gastromycetes (*Astraeus*, *Geastrum* and *Myriostoma*)


All spore measurements are without ornament.


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|---|---|---|
|  | 1. Spore-ball with many openings and with many stems at the bottom. Spores spherical, 4-5 µm, with large, sinuate crests; on warm, calcareous soil in forests and scrubs (southern) . . . <i>Myriostoma coliforme</i>
Spore-ball with an opening at the top and with one or no stem . . . 2 |  |
|  | 2. The inner side of the rays cracking in a pale reticulate pattern; fruitbodies very tough; without columella; ectomycorrhizal; spores wider than 6 µm. Spores sperical, 6-10 µm, with markant warted-spiny ornament; on ± sandy soil with <i>Quercus</i> ; very rare . . . <i>Astraeus pteridis</i> |  |
|  | The inner side of the rays not with pale reticulate pattern; fruitbodies less tough, but not fragile; with columella; spores less than 6 µm wide; spores [stjernebold (<i>Geastrum</i>)] . . . 3 | |
|  | 3. Spore-ball hairy and without an outer wall. Spores 4.5-6 µm; on ± calcareous soil in warm deciduous forests and scrubs; rare <i>Geastrum melanocephalum</i>
Spore-ball with well defined an outer wall 4 |  |
|  | 4. Opening zone with furrows 5
Opening zone smooth to somewhat fluffy 18 | |
|  | 5. Surface of the spore-ball rough (lens!); spore-ball with a short stem 6
Surface of the spore-ball smooth or mealy; spore-ball with or without a short stem 10 |  |
|  | 6. Fruitbody not hygroscopic (permanently open at maturity) 7
Fruitbody ± hygroscopic (curled up in dry weather) 8 | |
| | 7. Spore-ball 15-25 mm wide; spores on average 4.3 µm. Spores 3.5-4.5 µm, coarsly warted; in lush forests; rare <i>Geastrum berkeleyi</i>
Spore-ball 5-10 mm wide; spores on average 4.8 µm. Spores 4.5-5.5 mm, warted-spiny; in open warm environments; rare <i>Geastrum pseudostriatum</i> |  |
| | 8. With a diffuse zone around the opening see <i>Geastrum pseudolimbatum</i> , cp. 23
With a well defined zone around the opening 9 | |
|  | 9. Rays with a fixed felty layer. Fresh fruitbodies first with pale, clay-pink to brownish vinaceous rays, later reddish brown; spores 4.5-5.7 µm; on sandy, calcareous, open land; rare <i>Geastrum campestre</i>
Rays a with quickly loosening felty layer exposing a whitish surface. Fresh fruitbodies with orange-brown rays; spores 4-5 µm, spiny; in steppe-like vegetation, e.g. with <i>Juniperus</i> ; rare <i>Geastrum pouzarii</i> |  |
| | 10. Spore-ball ± sessile 11
Spore-ball with a short stem (best visible in dried material) 14 | |
|  | 11. Fruitbody not hygroscopic (permanently open at maturity) 12
Fruitbody hygroscopic (curled up in dry weather) 13 | |
|  | 12. Fruitbody formed below ground; spore-ball mealy. Spores 4.5-5.5 µm, warted-spiny; on calcareous sand in open environments; rare <i>Geastrum elegans</i>
Fruitbody formed above ground; spore-ball not mealy. The fruitbody may recall <i>Geastrum michelianum</i> with a furrowed opening zone; spores 3-4 µm, rather coarsly spiny; on debris and mull in coastal deciduous and coniferous forests; rare <i>Geastrum morgani</i> |  |
| | 13. Without well defined zone around the opening. Spores 4.5-5.5 µm, with fine spines; on warm, often rather open habitats; very rare <i>Geastrum floriforme</i>
With well defined zone around the opening. Spores 4-4.5 µm; in warm scrubs; very rare <i>Geastrum corollinum</i> |  |
|  | 14. Spore-ball with downward facing collar below. Spore-ball white |  |

- and mealy and somewhat flattened (lens-shaped); spores 4-4.5 μm , spiny; on \pm disturbed soil in parks and gardens, often below exotic coniferous trees; rather rare *Geastrum striatum*
- Spore-ball without downward facing collar, but in young material there may be an upward facing collar below the spore-ball 15
-  15. Spore-ball with furrowed base. Spores 3.5-4.5 μm , with long, flat-topped spines; on \pm calcareous soil, often below coniferous trees, including *Juniperus*, and on old anthills; rare *Geastrum pectinatum*
- Spore-ball without furrows at base 16
-  16. Opening zone with 20-50 furrows. Stem less than 1 mm long; spores 3.5-5 μm , with low warts; in dry, Mediterranean forest on often sandy soil *Geastrum senoretiae*
- Opening zone with 10-26 furrows 17
-  17. Surface of the spore ball \pm mealy; stem very short. Spores 4-6 μm , with irregular or even sinuate warts; in dry, Mediterranean parks and forest with e.g. *Olea* and *Cupressus* *Geastrum parovstriatum*
- Surface of the spore ball smooth; stem more than 1 mm long. Spores 4.5-5.5 μm , with low warts; in calcareous sand; rare *Geastrum schmidelii*
-  18. Fruitbody stands erect upon an immersed bowl-like base; mostly with four rays 19
- Without a bowl-like base; with more rays 21
-  19. With a diffuse zone around the opening; spore-ball rather dark, 10-15 mm wide. Spores 3.5-4.5 μm , finely spiny; in lush forests and scrubs, sometimes in hollows in old trees; rare *Geastrum fornicatum*
-  With well defined zone around the opening; spore-ball with a pale, finely mealy surface, 5-10 mm wide 20
20. Crystals on the surface of the spore-ball doublepyramidal, (10-) 15-50 (-60) μm ; spores spherical, (4.5-) 5-6 μm with 0.8 μm high warts. Spore-ball 5-10 mm wide; on needle debris on clay, \pm calcareous soil; rare *Geastrum quadrifidum*
- Doublepyramidal crystals on the surface of the spore-ball gathered in 60-120 μm large, irregular groups – the singular crystals up to 80 μm in diameter; spores spherical to somewhat oblong, (3.5-) 4-4.5 (-5) μm with up to 0.5 (-0.6) μm high warts. Spore-ball 11-12 mm wide; on debris in deciduous and coniferous, probably calcareous; rare *Geastrum britannicum*
-  21. Spore-ball with a short stem (best visible in dried material) 22
- Spore-ball sessile 27
-  22. With diffuse or absent zone around the opening 23
- With well defined zone around the opening 25
-  23. Fruitbody with flesh-pink () shades, especially as young. Spore-ball 10-30 mm wide; spores 4.5-5.5 μm , coarsly warted; on \pm calcareous soil in forests and scrubs; rather rare *Geastrum rufescens*
- Fruitbody greyish to \pm brown ( ), without pinkish shades 24
24. Spores 4.5-5.5 μm , rather coarsly ornamented see *Geastrum pseudolimbatum*, cp. 25
- Spores 4-5 μm , finely ornamented. Spore-ball 10-35 mm wide; on rich soil in warm scrubs, parks and gardens; rare *Geastrum coronatum*
-  25. Fruitbody somewhat hygroscopic; spore-ball with a pronounced stem. The spore-ball 7-15 mm wide, not quite covered by the rays in dry condition; spores 4.5-5.5 μm , spiny; on \pm calcareous soil in warm tørre habitats; rare *Geastrum pseudolimbatum*
- Fruitbody not hygroscopic; spore-ball with a reduced stem 26
26. Rays with a well fixed felt layer that incorporates soil; with curled




- rays. Spore-ball 3-10 mm wide; spores 4.5-5.5 μm , with scattered warts; on calcareous sand, especially in dunes; rare *Geastrum minimum* 


..... Rays with a somewhat loosening felt layer; with straight, pointed rays. Spore-ball 15-25 mm wide; spores 3-4.5 μm , densely warted; on soil in steppe-like vegetation; rare *Geastrum smardae* 

27. With a diffuse zone around the opening. Spore-ball 10-30 mm wide; spores 3-4 μm , with scattered spines; on debris on rich, sandy mull in scrubs and forests; scattered *Geastrum fimbriatum* 

..... With a rather well defined zone around the opening 28

28. Mostly with an inner collar, originating from the cracking of the very thick and fleshy inside of the outer wall; spores 3.5-4.5 μm . Spore-ball 20-40 mm wide; on rich soil, debris and compost in forests, parks and gardens; rather common *Geastrum michelianum* 

..... Mostly without collar; spores below 4 μm 29

29. Spores 2.5-3.5 μm . Spore-ball 10-15 mm wide; with 6-9 long pointed and narrow rays; on dry soil in open forests; rare *Geastrum lageniforme* 

..... Spores 3.2-4 μm . Spore-ball 5-20 mm wide; with 5-8 rather short, often curled, pointed rays; on \pm calcareous, soil in scrubs, hedges and open forests; rare *Geastrum saccatum* 