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A CONTRIBUTION TO THE KNOWLEDGE OF THE TERRESTRIAL SNAILS (MOLLUSCA: GASTROPODA TERRESTRIA) OF KORNATI NATIONAL PARK (CROATIA)

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Field surveys of Kornati National Park (northern Dalmatia, Croatia) revealed the presence of 39 terrestrial snail species, excluding slugs. Prominent finds included *Agathylla lamellosa* (J. A. Wagner, 1829), for which this is the second find within the recently discovered northern part of its disjunctive range, *Delima vidovichii robusta* (Küster, 1847), for which the find in the Kornati archipelago is its northernmost location, about 50 km outside its previously known range, *Lauria sempronii* (Charpentier, 1837), which has only five localities in Croatia and *Delima albocincta albocincta* (L. Pfeiffer, 1841), which is endemic to the broader Kornati region. The literature listed 15 species, of which only *Lindholmiola corcyrensis* (Rossmässler, 1838) was not confirmed. We believe that this species does not inhabit the Kornati islands, but was instead washed up by the sea. Agriculture, tourism and development within Kornati National Park currently pose no threat to terrestrial snails but efforts should be made to ensure that this state is maintained or improved in the future, primary concern being directed to ensuring that the localities and habitats of rare species are not destroyed.

Key words: land snails, Kornati National Park, Croatia

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Terenskim istraživanjem Nacionalnog parka Kornati (sjeverna Dalmacija, Hrvatska) nađeno je 39 vrsta kopnenih puževa s kućicom. Među njima ističu se *Agathylla lamellosa* (J. A. Wagner, 1829), kojoj je ovo drugi nalaz unutar nedavno otkrivenog sjevernog dijela disjunktnog areala, *Delima vidovichii robusta* (Küster, 1847), koja na Kornatima ima najsjevernije nalazište udaljeno oko 50 km od dosada poznatog areala, *Lauria sempronii* (Charpentier, 1837), kojoj bi ovo bilo tek 5 nalazište u Hrvatskoj, te *Delima albocincta albocincta* (L. Pfeiffer, 1841), endem šireg područja Kornata. U literaturi je bilo zabilježeno 15 vrsta, od kojih nije potvrđen nalaz svojte *Lindholmiola corcyrensis* (Rossmässler, 1838). Smatramo da ona ne obitava na Kornatima, već da je tamo naplavljena morem. Poljoprivredne, turističke i urbanističke aktivnosti unutar Nacionalnog parka Kornati zasada ne ugrožavaju faunu kopnenih puževa. Trebalo bi omogućiti da se takvo stanje ubuduće održi ili poboljša, a prvenstveno treba paziti da se nalazišta i staništa rijetkih vrsta ne unište.

Ključne riječi: kopneni puževi, Nacionalni park Kornati, Hrvatska

INTRODUCTION

The Kornati archipelago is situated in the Dalmatian part of the eastern Adriatic coast (Croatia) (Fig. 1). This is the most indented island system in the Adriatic Sea, including 12% of all the islands of the Croatian part of the Adriatic (www.kornati.hr).

The archipelago includes about 150 islands, islets and rocks (above-sea terrestrial units), covering a total area of 69 km^2 (BIRIN & DRAGANOVIĆ, 1994). Kornati National Park, proclaimed in 1980, includes 89 above-sea terrestrial units covering an area of 49.7 km^2 (www.kornati.hr), and only these islands were the subject of this study. Among them, the largest and highest is Kornat island: 25 km in length, 100 m to 6 km in width, altitude of 237 m and area of 32.5 km^2. Kornat island accounts for 65% of the total land mass in Kornati National Park, and only five other islands have an area of greater than 1 km^2. There are 29 islets which together account for one-third of the above-sea terrestrial units in the park, each with an area of less than 0.01 km^2. The Kornati islands have a Dinaric direction (i.e. from northwest to southeast), like the remainder of the eastern Adriatic coast. The islands are constructed virtually entirely of Cretaceous limestone (BIRIN & DRAGANOVIĆ, 1994). The only exception is the islet Vela Smokvica which is made entirely of Dolomite rock. The Kornati islands were formed during the last glaciation (Würm), no earlier than 15,000 years ago, when the sea level rose by 120 m, thus flooding lowlands, and today only the peaks of the former mountains lie above sea level. Until that time, they were an integral part of the mainland. Due to the relatively small area and low altitude, the climate is virtually uniform across the islands. This is a typical Mediterranean climate, with mild, rainy winters and hot, dry summers. The mean annual temperature is 15.6 °C, and the mean annual precipitation is 800 mm, in the form of rain (BIRIN & DRAGANOVIĆ, 1994). The main rain maximum is in October. Due to the scarce terrestrial vegetation, dew is typically heavy and to a certain degree replaces rain. Insolation is from 2600 to 2700 hours per year. The most common wind is the north-easterly bora (19.4%), and the strongest wind is

Fig. 1. Position of Kornati National Park in Croatia.

the south-westerly sirocco (www.kornati.hr). The islands are in the evergreen vegetation zone and were once forested. Today, stony pastures make up about 80% of the total area, while holm oak woods and their degradation stages are rare. The forests were lost due to human activities, such as burning or cutting to create pastures. Forest clearing resulted in soil erosion, and today's grasslands are on thin soils (BIRIN & DRAGANOVIĆ, 1994).

The history of the research

Due to the lack of permanent human settlements and transport connections, the malacofauna of Kornati National Park has been poorly studied. As a result, only a small number of papers have been published and a small number of species recorded for this area. ŠTAMOL *et al*. (2012) lists two papers (BIELZ, 1865; KUŠČER, 1930), and we found a third additional publication (STROBEL, 1854), altogether with data for 15 taxa of terrestrial snails in the Kornati archipelago. Of those, 12 taxa were recorded for Kornat island (STROBEL, 1854; BIELZ, 1865; KUŠČER, 1930), and 10 taxa on 6 islets (KUŠČER, 1930). The literature also contains data that cannot be attributed to the Kornati islands with certainty, such as »Scolia in Dalmatien«, »Scoglia in Dalmatien«, »scogli di Zara«, »auf den Scoglien bei Zara« (ROSSMÄSSLER, 1836, 1842; ANONYMOUS, 1846, 1846a; STROBEL, 1854; BRUSINA, 1866; ZILCH *et al*., 2002), or to islands within today's park boundaries, as the localities listed state only »Kornati« (NORDSIECK, 1969; FRANK, 1991). It should be stated that the islet Smokvica in the Kornati archipelago was incorrectly listed as the finding site and locus typicus for the taxon *Delima* (*Delima*) *amoena smokvicensis* A. J. Wagner, 1915, as the data refer to an islet of the same name near the southern Dalmatian island of Lastovo (ZILCH *et al*., 2002; ŠTAMOL *et al*., 2012). There are few species of terrestrial snails listed in the literature and among them no small species are mentioned, which along with the small number of malacologically studied localities indicates the lack of knowledge of the Kornati malacofauna. For that reason, it was necessary to conduct a systematic survey of the terrestrial snails of Kornati National Park.

MATERIALS AND METHODS

The majority of field surveys in Kornati National Park were conducted in 1998, 1999 and 2001 while several locations that had previously been missed or required repeated survey were examined in 2002. All above-sea terrestrial units of the national park possessing the conditions for the survival of snails were examined, including 76 islets and rocks, which hereinafter will be referred to as islets, and Kornat island itself. Small species inhabiting the rocks and adult individuals of larger species were collected individually. Soil samples were also taken out of which, after drying and sieving through a series of sieves with decreasing mesh sizes, snails were separated. Sampling locations were selected so as to include all altitude zones, the majority of macrohabitats (Figs 2, 3a-b) and microhabitats and to ensure the relatively even distribution of localities. Samples were collected in both above-ground and underground habitats. Because of the other methods necessary for the collection and proper presentation of the fauna of slugs, the latter were not covered in this investigation. Three persons participated in sample collection at all above-ground localities (senior museum taxidermist Zlatko Godec and the first two authors), and collection lasted approximately 30 minutes per locality. Samples were collected in

Fig. 2. Cliffs – a distinctive habitat with specific species of terrestrial snails (photo: Z. Ružanović).

Fig. 3a-b. Stony grasslands – the dominant habitat in Kornati National Park (photo: Z. Ružanović)

speleological features by geologist Damir Lacković (BSc) and senior museum technician Branko Jalžić. All sample collectors are employees of the Croatian Natural History Museum in Zagreb. The material is stored in the General Collection of Recent Molluscs in the Croatian Natural History Museum in Zagreb.

RESULTS AND DISCUSSION

A list of sites

The list contains the numerical marks for localities, as given in Figs. 4 and 5. Each locality is followed by toponyms, from largest to smallest, sampling altitude, UTM and GPS coordinates, and habitat. GPS coordinates were not taken using a GPS device during the field survey, but were subsequently determined from the topographic maps 1:25000 of the Military Geography Institute (1984). Numbers from 1 to 68 refer to localities located on Kornat island, and from 69 to 275 belong to the islets of Kornati National Park. The names of the islets and of the places are taken from the above mentioned topographic maps (1984). If the names of islets differ in various literature sources, then the name from the 1:25000 topographic map (1984) is followed by the synonym in brackets, and the source is listed in abbreviated form: i) NPK for Traveler´s map of National park of Kornati (BIRIN, 2011); ii) MM for marine maps (1986), iii) VAH for Veliki Atlas Hrvatske [=Great Atlas of Croatia] (BOROVAC, 2002).

1. Kornat (island), Tomasovac, Špraljin stan; 0-10 m a.s.l.; WJ15; x=4858.57, y=5518.357; stony grassland
2. Kornat (island), Tomasovac-Lupešćina; 30 m a.s.l.; WJ15; x=4858.558, y=5518.661; stony grassland
3. Kornat (island), Lupešćina, Šandrićev stan; 0-10 m a.s.l.; WJ15; x=4858.362, y=5519.561; stony grassland
4. Kornat (island), Lupešćina, Šandrićev stan; 10 m a.s.l.; WJ15; x=4858.574, y=5520.037; stony grassland
5. Kornat (island), Donji stival; 0-5 m a.s.l.; WJ25; x=4858.574, y=5520.037; stony grassland
6. Kornat (island), Donji stival; 10 m a.s.l.; WJ25; x=4857.754, y=5520.446; stony grassland
7. Kornat (island), Šipnate; 70 m a.s.l.; WJ15; x=4856.31, y=5520.398; rocks
8. Kornat (island), Šipnate; 1-5 m a.s.l.; WJ15; x=4856.19, y=5520.262; olive grove, stone house;
9. Kornat (island), Šipnate; 10 m a.s.l.; WJ15; x=4856.046, y=5520.446; olive grove, dry stone wall
10. Kornat (island), Babića vrh; 20 m a.s.l.; WJ15; x=4855.554, y=5520.422; stony grassland
11. Kornat (island), Lučica; 10 m a.s.l.; WJ25; x=4854.922, y=5521.038; rocks, stony grassland, next to houses
12. Kornat (island), Lučica; 10 m a.s.l.; WJ25; x=4854.79, y=5521.002; dry stone walls
13. Kornat (island), Kravljačica, Tarac, Toreta; 30 m a.s.l.; WJ25; x=4853.838, y=5521.422; rocks
14. Kornat (island), Kravljačica, Tarac, Toreta; 40 m a.s.l.; WJ25; x=4853.918, y=5521.578; rocks
15. Kornat (island), Kravljačica, Tarac, Toreta; 50 m a.s.l.; WJ25; x=4853.926, y=5521.482; fortification walls
16. Kornat (island), Kravljačica, Tarac, Sv. Marija; 10 m a.s.l.; WJ25; x=4853.818, y=5521.69; stony grassland
17. Kornat (island), Kravljačica, Tarac; 15 m a.s.l.; WJ25; x=4853.91, y=5521.854; stony grassland
18. Kornat (island), Zala draga, southern part of the bay; 10 m a.s.l.; WJ25; x=4855.546, y=5522.68; stony grassland

19. Kornat (island), Zala draga, southern part of the bay; 45 m a.s.l.; WJ25; x=4855.478, y=5522.714; stony grassland
20. Kornat (island), Zala draga, northern part of the bay; 60 m a.s.l.; WJ25; x=4855.482, y=5522.59; stony grassland
21. Kornat (island), Kravljačica, Željkovac; 50 m a.s.l.; WJ25; x=4854.122, y=5522.486; grassland, dry stone wall
22. Kornat (island), Kravljačica; 1-2 m a.s.l.; WJ25; x=4853.742, y=5522.41; stony grassland
23. Kornat (island), Metlina, southwestern slope; 160 m a.s.l.; WJ25; x=4853.838, y=5523.506; rocks
24. Kornat (island), Metlina (summit); 230 m a.s.l.; WJ25; x=4853.938, y=5523.658; stony grassland
25. Kornat (island), Strižnja, Ploča; 200-219 m a.s.l.; WJ25; x=4854.282, y=5524.134;stones
26. Kornat (island), Strižnja, Ploča; 220 m a.s.l.; WJ25; x=4854.126, y=5524.17; stones
27. Kornat (island), Magazinova škrila; 170 m a.s.l.; WJ25; x=4853.922, y=5524.094; stony grassland
28. Kornat (island), Strižnja; 40 m a.s.l.; WJ25; x=4853.346, y=5523.678; rocks
29. Kornat (island), Strižnja; 10 m a.s.l.; WJ25; x=4852.906, y=5523.45; rocks, olive grove
30. Kornat (island), Vrulje, Smokvena; 100 m a.s.l.; WJ25; x=4852.862, y=5524.062; stony grassland
31. Kornat (island), Vrulje, Smokvena; 100 m a.s.l.; WJ25; x=4852.838, y=5524.294; grassland
32. Kornat (island), Crnike; 10 m a.s.l.; WJ25; x=4853.73, y=5525.182; holm oak woods and maquis
33. Kornat (island), Crnike; 2-10 m a.s.l.; WJ25; x=4853.326, y=5525.702; holm oak woods and maquis
34. Kornat (island), Male Vrulje; 2-5 m a.s.l.; WJ25; x=4852.138, y=5524.314; dry stone wall, garden
35. Kornat (island), Jama iznad Vrulja (pit); 21 m a.s.l.; WJ25; x=4852.03, y=5524.586; in the pit
36. Kornat (island), Vrulje; 2 m a.s.l.; WJ25; x=4851.866, y=5524.99; dry stone walls, rocks
37. Kornat (island), Vrulje; 1-3 m a.s.l.; WJ25; x=4851.682, y=5524.99; dry stone walls, house walls
38. Kornat (island), Jama ispod Vruljskog brda (pit); 16 m a.s.l.; WJ25; x=4851.614, y=5524.974; in the pit
39. Kornat (island), Vrulje; 20 m a.s.l.; WJ25; x=4851.802, y=5525.198; dry stone walls, rocks
40. Kornat (island), Vidov vrh (summit); 100 m a.s.l.; WJ25; x=4852.09, y=5525.626; semi-cave
41. Kornat (island), Vrulje, Čirjak; 170 m a.s.l.; WJ25; x=4852.002, y=5526.266; stony grassland
42. Kornat (island), Vrulje, Trčenjak; 140 m a.s.l.; WJ25; x=4851.47, y=5526.734; rocks
43. Kornat (island), Vrulje, Trtuša; 30 m a.s.l.; WJ25; x=4851.262, y=5526.186; dry stone walls, field
44. Kornat (island), Maslinovica; 30 m a.s.l.; WJ24; x=4850.686, y=5525.654; rocks
45. Kornat (island), Knežak – northern part; 75 m a.s.l.; WJ24; x=4850.538, y=5527.582; dry stone wall, old house
46. Kornat (island), Knežak; 100 m a.s.l.; WJ24; x=4850.462, y=5527.702; rocks, grassland
47. Kornat (island), Stiniva; 1-20 m a.s.l.; WJ25; x=4851.462, y=5527.762; stony grassland
48. Kornat (island), Knežak, Lovrićev stan; 60 m a.s.l.; WJ24; x=4850.326, y=5528.162; stony grassland
49. Kornat (island), Koritnica, Turčinov stan; 40 m a.s.l.; WJ24; x=4849.722, y=5527.23; rocks
50. Kornat (island), Koritnica, Turčinov stan; 1-5 m a.s.l.; WJ24; x=4849.526, y=5527.31; stony grassland
51. Kornat (island), Koritnica, Turčinov stan; 20 m a.s.l.; WJ24; x=4849.578, y=5527.63; stony grassland
52. Kornat (island), Knežak, Markov stan; 70-80 m a.s.l.; WJ24; x=4849.426, y=5528.754; old house
53. Kornat (island), Vela Ropotnica, Markov stan; 1-5 m a.s.l.; WJ24; x=4848.686, y=5529.286; stony grassland
54. Kornat (island), Jama iznad uvale Vela Ropotnica (pit); 40 m a.s.l.; WJ24; x=4848.746, y=5529.378; in the pit

55. Kornat (island), Crveni bok; 40 m a.s.l.; WJ34; x=4847.514, y=5531.204; stony grassland
56. Kornat (island), Crveni bok; 90 m a.s.l.; WJ34; x=4847.67, y=5531.144; stony grassland
57. Kornat (island), Debela prisliga; 5-10 m a.s.l.; WJ34; x=4846.53, y=5532.924; stony grassland
58. Kornat (island), Poštenjak; 50-60 m a.s.l.; WJ34; x=4846.17, y=5533.264; rocks
59. Kornat (island), Obručan; 30-40 m a.s.l.; WJ34; x=4845.338, y=5534.504; rocks
60. Kornat (island), Tanka prisliga; 5-10 m a.s.l.; WJ34; x=4844.788, y=5535.546; stony grassland
61. Kornat (island), Koromačna, Vela rupa; 30 m a.s.l.; WJ34; x=4844.276, y=5536.026; dry stone walls, rocks
62. Kornat (island), Koromačna; 1-2 m a.s.l.; WJ34; x=4844.484, y=5535.866; dry stone wall
63. Kornat (island), Mali Orjak; 10 m a.s.l.; WJ34; x=4844.28, y=5536.81; rocks, stony grassland
64. Kornat (island), Mali Orjak; 40 m a.s.l.; WJ34; x=4844.28, y=5536.718; rocks
65. Kornat (island), Opat; 1-5 m a.s.l.; WJ34; x=4843.924, y=5536.898; stones, stony grassland
66. Kornat (island), Opat; 80 m a.s.l.; WJ34; x=4843.84, y=5537.206; stony grassland
67. Kornat (island), Opat; 90-110 m a.s.l.; WJ34; x=4843.708, y=5537.29; stony grassland
68. Kornat (island), Opat; 90 m a.s.l.; WJ34; x=4843.792, y=5537.398; stony grassland
69. Aba Donja (islet) [NPK, VAH: »Aba Vela«]; NNE part of islet; 10-15 m a.s.l.; WJ15; x=4858.486, y=5517.509; rocks, stony grassland
70. Aba Donja (islet) [NPK, VAH: »Aba Vela«]; WNW part of islet; 55 m a.s.l.; WJ15; x=4858.274, y=5517.209; rocks, stony grassland
71. Aba Donja (islet) [NPK, VAH: »Aba Vela«]; southern part of islet; 10-30 m a.s.l.; WJ15; x=4857.642, y=5517.625; rocks, stony grassland
72. Dragunara (islet) [NPK: »Dragunarica Vela«]; central part of islet; 2-18 m a.s.l.; WJ15; x=4857.454, y=5518.177; rocks, stony grassland
73. Šilo Velo (islet) [NPK: »Šilo«; VAH: »Velo Šilo«]; northern part of islet; 25-63 m a.s.l.; WJ15; x=4857.014, y=5518.621; rocks
74. Šilo Velo (islet) [NPK: »Šilo«; VAH: »Velo Šilo«]; northern part of islet; 5-20 m a.s.l.; WJ15; x=4856.67, y=5518.601; stony grassland
75. Šilo Velo (islet) [NPK: »Šilo«; VAH: »Velo Šilo«]; Šilo; 5-29 m a.s.l.; WJ15; x=4856.086, y=5519.037; stony grassland, rocks
76. Zornik (islet); 5 m a.s.l.; WJ15; 4856.526, y=5519.485; stony grassland
77. Smokvenjak (islet); (NNW part of islet); 5–20 m a.s.l.; WJ15; x=4856.23, y=5519.457; rocks
78. Smokvenjak (islet); peak part and eastern part of the islet; 3–20 m a.s.l.; WJ15; x=4856.158, y=5519.533; rocks
79. Smokvenjak (islet); (southern part of islet); 3-15 m a.s.l.; WJ15; x=4855.998, y=5519.569; stony grassland
80. Šilo Malo (Crnikovac) (islet) [MM: »Šilo Malo«; NPK: »Crnikovac«; VAH: »Malo Šilo«]; NW part of islet; 2-5 m a.s.l.; WJ15; x=4855.786, y=5519.293; stony grassland
81. Šilo Malo (Crnikovac) (islet) [MM: »Šilo Malo«; NPK: »Crnikovac«; VAH: »Malo Šilo«]; central part of the islet; 2-5 m a.s.l.; WJ15; x=4855.73, y=5519.365; stony grassland
82. Šilo Malo (Crnikovac) (islet) [MM: »Šilo Malo«; NPK: »Crnikovac«; VAH: »Malo Šilo«]; SE part of islet; 2-5 m a.s.l.; WJ15; x=4855.626, y=5519.449; stony grassland
83. Tovarnjak (Prišnjak) (islet) [MM: »Prišnjak«; NPK: »Tovarnjak (Veli Prišnjak)«]; NE part of islet; 5 m a.s.l.; WJ15; x=4855.006, y=5519.761; stony grassland
84. Tovarnjak (Prišnjak) (islet) [MM: »Prišnjak«; NPK: »Tovarnjak (Veli Prišnjak)«]; central part of the islet; 5-11 m a.s.l.; WJ15; x=4854.926, y=5519.685; garrigue, rocks
85. Tovarnjak (Prišnjak) (islet) [MM: »Prišnjak«; NPK: »Tovarnjak (Veli Prišnjak)«]; SW part of islet; 2-10 m a.s.l.; WJ15; x=4854.862, y=5519.633; garrigue, rocks
86. Obručan Mali (islet) [VAH: »Mali Obručan«]; peak part of the islet; 15-20 m a.s.l.; WJ15; x=4854.622, y=5518.121; rocks
87. Obručan Mali (islet) [VAH: »Mali Obručan«]; central part of the islet; 10-20 m a.s.l.; WJ15; x=4854.658, y=5518.105; rocks, stony grassland
88. Obručan Mali (islet) [VAH: »Mali Obručan«]; 20 m a.s.l.; WJ15; x=4854.598, y=5518.125; cliff

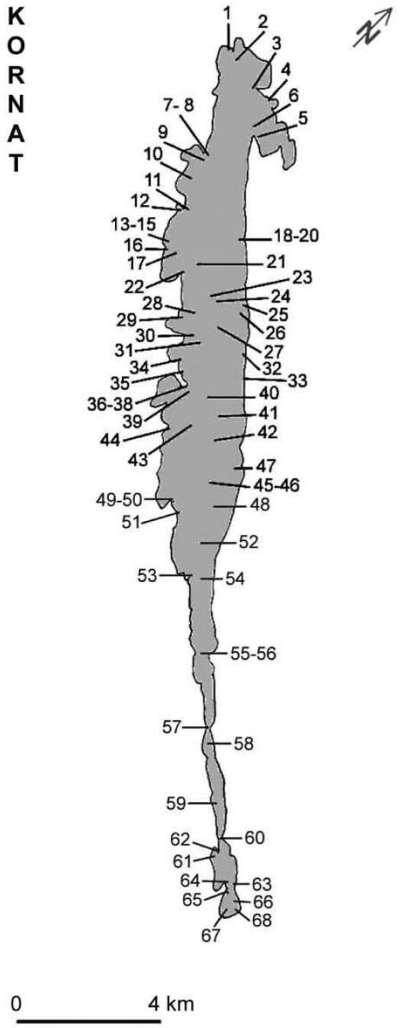

Fig. 4. The position of study localities on Kornat island. Numbers in the figure correspond to the numbers in the list of localities.

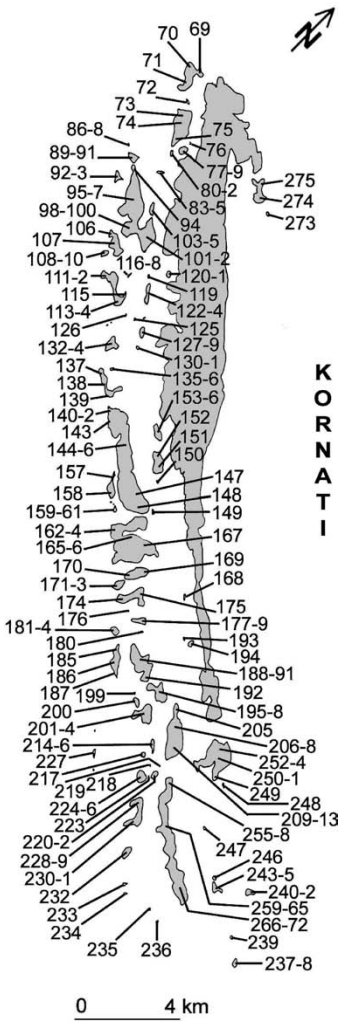

Fig. 5. The position of study localities on the islets of Kornati National Park. Numbers in the figure correspond to the numbers in the list of localities.

89. Obručan Veli (islet) [VAH: »Veli Obručan«]; 40 m a.s.l.; WJ15; x=4854.466, y=5518.713; rocks
90. Obručan Veli (islet) [VAH: »Veli Obručan«]; 50 m a.s.l.; WJ15; x=4854.442, y=5518.457; rocks
91. Obručan Veli (islet) [VAH: »Veli Obručan«]; 40 m a.s.l.; WJ15; x=4854.354, y=5518.529; rocks
92. Mrtovac (Mrtvac) (islet) [MM: »Mrtovac«; NPK: »Mrtvac«; VAH: »Mrtovac«]; NW part of islet; 5-20 m a.s.l.; WJ15; x=4853.586, y=5518.717; rocks, stony grassland
93. Mrtovac (Mrtvac) (islet) [MM: »Mrtovac«; NPK: »Mrtvac«; VAH: »Mrtovac«]; SE part of islet; 5-20 m a.s.l.; WJ15; x=4853.49, y=5518.933; rocks, stony grassland

94. Levrnaka (islet); Lončić; 20 m a.s.l.; WJ15; x=4854.246, y=5518.937; rocks
95. Levrnaka (islet); Veli vrh; 105 m a.s.l.; WJ15; x=4853.47, y=5520.085; rock fissure
96. Levrnaka (islet); Veli vrh, Špilja pod vrhom (cave); 30 m a.s.l.; WJ15; x=4853.186, y=5520.21; in the cave
97. Levrnaka (islet); Veli vrh; 90 m a.s.l.; WJ15; rocks
98. Levrnaka (islet); Levrnaka; 5 m a.s.l.; WJ25; x=4853.29, y=5520.358; next to houses
99. Levrnaka (islet); Lojena-Prisiliga; 64 m a.s.l.; WJ25; x=4852.678, y=5520.678; stony grassland
100. Levrnaka; Jama na Levrnaki I (pit); 25 m a.s.l.; Jama na Levrnaki II (pit); 30 m a.s.l.; WJ25; x=4852.698, y=5520.878; in the pit
101. Levrnaka (islet); Svirac; 90 m a.s.l.; WJ25; x=4852.986, y=5521.302; rocks
102. Levrnaka (islet); Svirac; 40 m a.s.l.; WJ25; x=4852.874, y=5521.19; stony grassland
103. Sušica (islet); NW part of islet; 10-20 m a.s.l.; WJ15; x=4853.95, y=5520.494; stony grassland
104. Sušica (islet); peak part and NE part of islet; 10-20 m a.s.l.; WJ25; x=4853.798, y=5520.666; stony grassland
105. Sušica (islet); S and SW parts of islet; 5-20 m a.s.l.; WJ25; x=4853.686, y=5520.774; stony grassland
106. Borovnik (islet); 45 m a.s.l.; WJ15; x=4852.01, y=5520.354; cliffs
107. Borovnik (islet); 50-56 m a.s.l.; WJ25; x=4851.938, y=5520.754; rocks
108. Balun (islet); central part of the islet; 5-29 m a.s.l.; WJ25; x=4851.37, y=5520.866; rocks
109. Balun (islet); western part of islet; 20 m a.s.l.; WJ25; x=4851.254, y=5520.782; cliff
110. Balun (islet); NE part of islet; 10-29 m a.s.l.; WJ25; x=4851.47, y=5520.858; rocks, stony grassland; cave on the cliff;
111. Mana (islet); western part of islet 40 m a.s.l.; WJ25; x=4850.782, y=5521.53; rocks, under stones
112. Mana (islet); western part of islet; 2-5 m a.s.l.; WJ25; x=4850.95, y=5521.662; grassland on sandy soils
113. Mana (islet); SE part of islet; 77 m a.s.l.; WJ24; x=4850.582, y=5522.422; rocks
114. Mana; SE part of islet; 77 m a.s.l.; WJ24; x=4850.602, y=5522.626; rocks
115. Mana (islet); Luka Mana, NE part of islet; 2-10 m a.s.l.; WJ24; x=4850.958, y=5522.618; stony grassland
116. Plešćina (Plešćenica) (islet) [MM, NPK: »Plešćina«]; SE part of islet; 5 m a.s.l.; WJ25; x=4851.346, y=5522.234; stony grassland
117. Plešćina (Plešćenica) (islet) [MM, NPK: »Plešćina«]; central part of the islet; 10-20 m a.s.l.; WJ25; x=4851.594, y=5522.114; stony grassland, rocks
118. Plešćina (Plešćenica) (islet) [MM, NPK: »Plešćina«]; northern part of islet; 5-20 m a.s.l.; WJ25; x=4851.754, y=5522.054; stony grassland, rocks
119. Golić (islet); 1-5 m a.s.l.; WJ25; x=4852.142, y=5522.59; stony grassland
120. Strižnjak (islet); 2-10 m a.s.l.; WJ25; x=4852.738, y=5523.026; stony grassland
121. Strižnjak (islet); 14 m a.s.l.; WJ25; x=4852.802, y=5522.97; stony grassland
122. Bisaga (islet); N and NW parts of islet; 10-20 m a.s.l.; WJ25; x=4851.802, y=5522.966; stony grassland
123. Bisaga (islet); southern part of islet; 20 m a.s.l.; WJ25; x=4851.566, y=5523.194; stony grassland
124. Bisaga (islet); eastern and NE parts of islet; 7-10 m a.s.l.; WJ25; x=4851.938, y=5522.87; stony grassland
125. Mali Babuljaš (islet) [MM: »Babuljaši Mali«; NPK: »Sikica Gornja«]; 5 m a.s.l.; WJ25; x=4850.734, y=5523.538; stony grassland
126. Veli Babuljaš (islet) [MM: »Babuljaši Veli«; NPK: »Sikica Donja«]; 5 m a.s.l.; WJ24; x=4850.57, y=5523.23; stony grassland
127. Maslinjak (islet); 5-15 m a.s.l.; WJ24; x=4850.754, y=5524.022; stony grassland, rocks
128. Maslinjak (islet); 20 m a.s.l.; WJ24; x=4850.622, y=5524.01; stony grassland, rocks

129. Maslinjak (islet); 30-39 m a.s.l.; WJ24; x=4850.594, y=5524.082; stony grassland, rocks
130. Arapovac (islet); 2-6 m a.s.l.; WJ24; x=4850.162, y=5524.434; holm oak woods: litter, rocks
131. Arapovac (islet); 2-11 m a.s.l.; WJ24; x=4850.134, y=5524.498, stony grassland
132. Rašip Mali (islet) [VAH: »Mali Rašip«]; 10-40 m a.s.l.; WJ24; x=4849.654, y=5523.63; rocks, stony grassland
133. Rašip Mali (islet) [VAH: »Mali Rašip«]; 20-56 m a.s.l.; WJ24; x=4849.35, y=5523.646; cliffs
134. Rašip Mali (islet) [VAH: »Mali Rašip«]; 10-20 m a.s.l.; WJ24; x=4849.434, y=5523.822; stony grassland
135. Rašipić (islet); 2-6 m a.s.l.; WJ24; x=4848.862, y=5524.502; holm oak grove; rocks
136. Rašipić (islet); 2-5 m a.s.l.; WJ24; x=4848.902, y=5524.506; holm oak grove; rocks
137. Rašip Veli (islet) [NPK: »Rašip«; VAH: »Veli Rašip«]; 60 m a.s.l.; WJ24; x=4848.254, y=5524.686; the more northerly cliff
138. Rašip Veli (islet) [NPK: »Rašip«; VAH: »Veli Rašip«]; 10-40 m a.s.l.; WJ24; x=4848.238, y=5524.858; cliffs, stony grassland
139. Rašip Veli (islet) [NPK: »Rašip«; VAH: »Veli Rašip«]; 40 m a.s.l.; WJ24; x=4848.13, y=5525.162; cliff
140. Piškera (islet) [NPK: »Piškera (Jadra)«]; Cuf; 20 m a.s.l.; WJ24; x=4847.854, y=5525.53; cliffs
141. Piškera (islet) [NPK: »Piškera (Jadra)«]; Cuf; 0-15 m a.s.l.; WJ24; x=4847.862, y=5525.762; stony grassland
142. Piškera (islet) [NPK: »Piškera (Jadra)«]; Cuf; 40 m a.s.l.; WJ24; x=4847.734, y=5525.786; cliffs
143. Piškera (islet) [NPK: »Piškera (Jadra)«]; Nozdra; 30 m a.s.l.; WJ24; x=4847.618, y=5525.938; rocks
144. Piškera (islet) [NPK: »Piškera (Jadra)«]; Dugi vrh; 20-30 m a.s.l.; WJ24; x=4847.478, y=5527.45; rocks
145. Piškera (islet) [NPK: »Piškera (Jadra)«] ŠNPK: »Piškera (Jadra)«Ć; Dugi vrh; 10-20 m a.s.l.; WJ24; x=4847.39, y=5527.558; rocks
146. Piškera (islet) [NPK: »Piškera (Jadra)«]; Dugi vrh; 50 m a.s.l.; WJ24; x=4847.314, y=5527.474; around the semi-cave
147. Piškera (islet) [NPK: »Piškera (Jadra)«]; Gornji bok; 2-10 m a.s.l.; WJ24; x=4846.778, y=5529.006; stony grassland
148. Piškera (islet) [NPK: »Piškera (Jadra)«]; eastern part of islet; 10-20 m a.s.l.; WJ24; x=4846.57, y=5529.574; stony grassland, rocks
149. Veseljuh (islet) [NPK: »Vesejuh«]; 0-2 m a.s.l.; WJ24; x=4846.746, y=5529.762; stony grassland
150. Blitvica (islet); 5-8,5 m a.s.l.; WJ24; x=4847.606, y=5529.018; stony grassland
151. Gustac (islet), Piškera (islet); 2 m a.s.l.; WJ24; Gustac, Piškera; next to the house
152. Gustac (islet), Piškera (islet); 10-30 m a.s.l.; WJ24; x=4848.09, y=5528.166; rocks
153. Koritnjak (islet); southern part of islet; 30 m a.s.l.; WJ24; x=4848.65, y=5527.778; rocks, stony grassland
154. Koritnjak (islet); southern part of islet; 30-46 m a.s.l.; WJ24; x=4848.678, y=5527.59; rocks, stony grassland
155. Koritnjak (islet); central part of the islet; 10-20 m a.s.l.; WJ24; x=4848.726, y=5527.454; stony grassland
156. Koritnjak (islet); southern part of islet; 20 m a.s.l.; WJ24; x=4848.826, y=5527.246; stony grassland
157. Panitula Vela (islet) [VAH: »Vela Panitula«]; northern part of islet; 15 m a.s.l.; WJ24; x=4846.386, y=5527.79; cliffs
158. Panitula Vela (islet) [VAH: »Vela Panitula«]; southern part of islet; 30 m a.s.l.; WJ24; x=4845.906, y=5528.218; rocks, stony grassland
159. Panitula Mala (islet) [VAH: »Mala Panitula«]; 3-10 m a.s.l.; WJ24; x=4845.642, y=5528.93; halophile vegetation

160. Panitula Mala (islet) [VAH: »Mala Panitula«]; northern part of islet; 2-20 m a.s.l.; WJ24; x=4845.722, y=5528.746; halophile vegetation
161. Panitula Mala (islet) [VAH: »Mala Panitula«]; SW part of islet; 15-20 m a.s.l.; WJ24; x=4845.594, y=5528.842; top of the cliff
162. Lavsa (islet); Čelina; 40-47 m a.s.l.; WJ24; x=4845.15, y=5529.3; around the cave; stony grassland
163. Lavsa (islet); Kantarač; 10 m a.s.l.; WJ24; x=4844.946, y=5529.586; stony grassland
164. Lavsa (islet); Glavica; 20 m a.s.l.; WJ24; x=4844.958, y=5529.789; fields, dry stone walls
165. Lavsa (islet); Lavsa; 2 m a.s.l.; WJ24; x=4845.186, y=5529.918; fields, dry stone walls
166. Lavsa (islet); Lavsa; 2 m a.s.l.; WJ24; x=4845.502, y=5529.954; next to houses and rocks in a pine grove
167. Lavsa (islet); Veli vrh; 109-111 m a.s.l.; WJ34; x=4845.186, y=5530.71; rocks
168. Krpeljina (islet) [NPK: »Oršjak (Krpejina)«]; 3-12 m a.s.l.; WJ15; x=4845.654, y=5533.08; stony grassland
169. Gustac (islet), Lavsa (islet); nortehrn part of islet; 10-70 m a.s.l.; WJ34; x=4845.064, y=5531.349; stony grassland
170. Gustac (islet), Lavsa (islet); southern part of islet; 10-70 m a.s.l.; WJ34; x=4844.568, y=5531.126; stony grassland
171. Klobučar (islet) [NPK: »Kolobučar (Klobučar)«]; 20 m a.s.l.; WJ34; x=4844.032, y=5531.062; coastal cliffs
172. Klobučar (islet) [NPK: »Kolobučar (Klobučar)«]; 20-80 m a.s.l.; WJ34; x=4843.92, y=5531.066; cliffs
173. Klobučar (islet) [NPK: »Kolobučar (Klobučar)«]; 70-80 m a.s.l.; WJ34; x=4843.82, y=5531.082; cliff
174. Kasela (islet); southern part of islet; 10-40 m a.s.l.; WJ34; x=4843.76, y=5531.694; summit of islet and cliff
175. Kasela (islet); northern part of islet; 10-40 m a.s.l.; WJ34; x=4844.324, y=5531.845; rocks, stony grassland
176. Hrid Kaselica (rock) [NPK: »Kaselica«]; 5-10 m a.s.l.; WJ34; x=4843.688, y=5532.15; stony grassland
177. Prišnjak Veli (islet) [NPK: »Prišnjak«; VAH: »Veli Prišnjak«]; SW part of islet; 5-20 m a.s.l.; WJ34; x=4843.596, y=5532.554; stony grassland, rocks
178. Prišnjak Veli (islet) [NPK: »Prišnjak«; VAH: »Veli Prišnjak«]; central part of the islet; 10-25 m a.s.l.; WJ34; x=4843.848, y=5532.798; stony grassland
179. Prišnjak Veli (islet) [NPK: »Prišnjak«; VAH: »Veli Prišnjak«]; NE part of islet; 10-35 m a.s.l.; WJ34; x=4843.964, y=5532.79; stony grassland
180. Prišnjak Mali (islet) [VAH: »Mali Prišnjak«] (islet); 10 m a.s.l.; WJ34; x=4843.608, y=5533.114; stony grassland
181. Vodenjak (islet); eastern part of islet; 10-40 m a.s.l.; WJ34; x=4842.828, y=5532.59; summit of islet and cliff
182. Vodenjak (islet); western part of islet; 10-40 m a.s.l.; WJ34; x=4842.776, y=5532.318; rocks, stony grassland
183. Vodenjak (islet); northern part of islet; 10-40 m a.s.l.; WJ34; x=4842.904, y=5532.446; rocks, stony grassland
184. Vodenjak (islet); northern part of islet; 10-40 m a.s.l.; WJ34; x=4842.88, y=5532.49; holm oak woods
185. Gominjak (islet); NW part of islet; 5-25 m a.s.l.; WJ34; x=4842.516, y=5533.022; rocks, stony grassland
186. Gominjak (islet); central part of the islet; 10-50 m a.s.l.; WJ34; x=4842.084, y=5533.446; rocks, stony grassland
187. Gominjak (islet); SE part of islet; 5-20 m a.s.l.; WJ34; x=4841.828, y=5533.75; rocks, stony grassland

188. Lunga (islet); 10-40 m a.s.l.; WJ34; x=4842.924, y=5533.466; rocks, stony grassland
189. Lunga (islet); 50-73 m a.s.l.; WJ34; x=4842.78, y=5533.758; rocks, stony grassland
190. Lunga (islet); 15 m a.s.l.; WJ34; x=4843.104, y=5534.026; rocks, stone house
191. Lunga (islet); Veli vrh; 10-80 m a.s.l.; WJ34; x=4842.748, y=5534.15; rocks, stony grassland
192. Lunga (islet); 20-50 m a.s.l.; WJ34; x=4842.644, y=5534.57; rocks, stony grassland
193. Bisaga (islet), Ravna Sika (islet); 2-9,5 m a.s.l.; WJ34; x=4844.652, y=5534.362; rocks
194. Ravna Sika (islet) [NPK: »Sika Ravna«]; 5-15 m a.s.l.; WJ34; x=4844.724, y=5534.618; rocks, stony grassland
195. Ravni Žakan (islet) [NPK: »Žakan Ravni«]; Osijek; 10-25 m a.s.l.; WJ34; x=4842.48, y=5534.998; rocks, stony grassland
196. Ravni Žakan (islet) [NPK: »Žakan Ravni«]; 2-5 m a.s.l.; WJ34; x=4842.608, y=5535.21; dry stone walls, stony grassland
197. Ravni Žakan (islet) [NPK: »Žakan Ravni«]; Vrh Žakan; 30-36 m a.s.l.; WJ34; x=4842.688, y=5535.569; rocks
198. Ravni Žakan (islet) [NPK: »Žakan Ravni«]; 2-5 m a.s.l.; WJ34; x=4842.576, y=5535.214; stony grassland
199. Žakanac (islet) [NPK: »Vodenjak Mali (Žakanac)«]; 2-8,6 m a.s.l.; WJ34; x=4842.008, y=5534.814; rocks, stony grassland
200. Jančar (islet) [NPK: »Janjčar«]; 4-19 m a.s.l.; WJ34; x=4841.756, y=5535.118; rocks, stony grassland
201. Kameni Žakan (islet) [NPK: »Žakan Kameni«]; 15 m a.s.l.; WJ34; x=4841.3, y=5535.514; rocks, stony grassland
202. Kameni Žakan (islet) [NPK: »Žakan Kameni«]; 5 m a.s.l.; WJ34; x=4841.64, y=5535.578; dry stone wall
203. Kameni Žakan (islet) [NPK: »Žakan Kameni«]; 5-15 m a.s.l.; WJ34; x=4841.904, y=5535.538; pine grove, stony grassland, dry stone wall
204. Kameni Žakan (islet) [NPK: »Žakan Kameni«]; 20-30 m a.s.l.; WJ34; x=4841.876, y=5535.758; rocks, stony grassland
205. Škulj (islet) [NPK: »Škuj«]; Glavičica; 5-30 m a.s.l.; WJ34; x=4842.712, y=5536.23; rocks, stony grassland
206. Škulj (islet) [NPK: »Škuj«]; Kovačev stan; 10-30 m a.s.l.; WJ34; x=4842.472, y=5536.514; next to the house; dry stone wall
207. Škulj (islet) [NPK: »Škuj«]; 60-70 m a.s.l.; WJ34; x=4842.276, y=5536.738; dry stone wall
208. Škulj (islet) [NPK: »Škuj«]; 100 m a.s.l.; WJ34; x=4842.06, y=5537.05; rocks
209. Škulj (islet) [NPK: »Škuj«]; Škulj; 130-140 m a.s.l.; WJ34; x=4841.84, y=5537.314; rocks
210. Škulj (islet) [NPK: »Škuj«]; Škulj; 10-30 m a.s.l.; WJ34; x=4841.64, y=5537.234; rocks, stony grassland
211. Škulj (islet) [NPK: »Škuj«]; 130 m a.s.l.; x=4841.652, y=5537.458; WJ34; rocks
212. Škulj [NPK: »Škuj«]; 100 m a.s.l.; x=4841.56, y=5537.57; WJ34; rocks
213. Škulj (islet) ŠNPK: »Škuj«]; 100 m a.s.l.; WJ34; x=4841.528, y=5537.421; rocks, stony grassland
214. Vela Prduša (islet) [NPK: »Prduša«]; 10-22 m a.s.l.; WJ34; x=4841.224, y=5536.714; stones, rocks
215. Vela Prduša (islet) [NPK: »Prduša«]; 10-15 m a.s.l.; WJ34; x=4841.156, y=5536.77; stony grassland, rocks
216. Vela Prduša (islet) [NPK: »Prduša«]; 5-10 m a.s.l.; WJ34; x=4840.996, y=5537.018; rocks, stony grassland
217. Mala Prduša (islet) [NPK: »Vodenjak (Prduša Mala)«]; 5-25 m a.s.l.; WJ33; x=4840.664, y=5536.882; rocks, stony grassland
218. Desetinjak Donji (islet); 1-2; x=4840.628, y=5537.354; stony grassland
219. Desetinjak Gornji (islet); 1-2; x=4840.788, y=5537.63; stony grassland

220. Garmenjak Mali (islet) [NPK: »Grego (Garmenjak Mali)«; VAH: »Mali Garmenjak«]; 20-29 m a.s.l.; WJ33; x=4840.6, y=5537.726; rocks, stony grassland
221. Garmenjak Mali (islet) [NPK: »Grego (Garmenjak Mali)«; VAH: »Mali Garmenjak«]; 10-15 m a.s.l.; WJ33; x=4840.532, y=5537.738; rocks, stony grassland
222. Garmenjak Mali (islet) [NPK: »Grego (Garmenjak Mali)«] VAH: »Mali Garmenjak«]; 5-10 m a.s.l.; WJ33; x=4840.396, y=5537.774; rocks, stony grassland
223. Desetinjak Južni (islet) [NPK: »Desetinjak«]; 1-2 m a.s.l.; WJ33; x=4840.308, y=5537.626; stony grassland
224. Garmenjak Veli (islet) [NPK: »Garmenjak«; VAH: »Veli Garmenjak«]; 25-40 m a.s.l.; WJ33; x=4840.172, y=5537.606; rocks, stony grassland
225. Garmenjak Veli (islet) [NPK: »Garmenjak«; VAH: »Veli Garmenjak«]; 0-25 m a.s.l.; WJ33; x=4840.008, y=5537.57; rocks, stony grassland
226. Garmenjak Veli (islet) [NPK: »Garmenjak«; VAH: »Veli Garmenjak«]; 30-50 m a.s.l.; WJ33; x=4840.148, y=5537.378; stony grassland, rocks
227. Purara (rock) [NPK: »Purara Vela«]; 5-30 m a.s.l.; WJ33; x=4839.26, y=5535.606; rocks, stony grassland
228. Oključ (islet); 40-53 m a.s.l.; WJ33; x=4839.44, y=5538.178; rocks, stony grassland
229. Oključ (islet); 20 m a.s.l.; WJ33; x=4839.14, y=5538.05; rocks, stony grassland
230. Oključ (islet); 55-69 m a.s.l.; WJ33; x=4838.96, y=5538.698; rocks, stony grassland
231. Oključ (islet); 15-30 m a.s.l.; WJ33; x=4838.588, y=5538.554; rocks, stony grassland
232. Lucmarinjak (islet); 5-42 m a.s.l.; WJ33; x=4837.856, y=5539.39; rocks, stony grassland
233. Otok Puh (islet) [MM: »Puh«; NPK: »Opuh Zmorašnji«]; 5-10 m a.s.l.; WJ33; x=4836.978, y=5540.342; stony grassland
234. Puh Gornji (islet) [NPK: »Opuh Južnji«]; 4-9,7 m a.s.l.; WJ43; x=4836.798, y=5540.610; stony grassland
235. Kameni Puh (islet) [MM: »Vodeni Puh«; NPK: »Opuh Vodeni«]; 3-7,6 m a.s.l.; WJ43; x=4837.166, y=5541.658; stony grassland
236. Vodeni Puh (islet) [MM: »Kameni Puh«; NPK: »Opuh Kameni«]; 10-18 m a.s.l.; WJ43; x=4837.066, y=5542.19; rocks
237. Samograd (islet); 10-30 m a.s.l.; WJ43; x=4838.266, y=5545.398; rocks, stony grassland
238. Samograd (islet); 10-30 m a.s.l.; WJ43; x=4838.362, y=5545.282; rocks, stony grassland
239. Vrtlić (islet); 5-10 m a.s.l.; WJ43; x=4838.862, y=5544.416; halophile vegetation
240. Mrtovnjak (islet) [NPK: »Mrtenjak (Mrtovnjak)«]; 5-20 m a.s.l.; WJ43; x=4840.514, y=5543.658; stony grassland; halophile vegetation
241. Mrtovnjak (islet) [NPK: »Mrtenjak (Mrtovnjak)«]; x=4840.418, y=5543.526; 35-40 m a.s.l.; WJ43; rocks
242. Mrtovnjak (islet) [NPK: »Mrtenjak (Mrtovnjak)«]; 2-15 m a.s.l.; WJ43; x=4840.61, y=5543.522; stony grassland
243. Skrižanj Veli (islet) [NPK: »Skrižanja Vela«; VAH: »Veli Skrižanj«]; 2-5 m a.s.l.; WJ43; x=4839.686, y=5542.776; stones, halophile vegetation
244. Skrižanj Veli (islet) [NPK: »Skrižanja Vela«; VAH: »Veli Skrižanj«]; 2-10 m a.s.l.; WJ43; x=4839.622, y=5542.560; stones
245. Skrižanj Veli (islet) [NPK: »Skrižanja Vela«; VAH: »Veli Skrižanj«]; 7-18 m a.s.l.; WJ43; x=4839.498, y=5542.606; stones
246. Skrižanj Mali (islet) [NPK: »Skrižanja Mala«; VAH: »Mali Skrižanj«]; 2-10 m a.s.l.; WJ43; x=4839.79, y=5542.262; stones
247. Babina guzica (islet); 4-17 m a.s.l.; WJ33; x=4840.758, y=5540.486; rocks, stony grassland
248. Smokvica Mala (islet) [VAH: »Mala Smokvica«]; 2-4,3 m a.s.l.; WJ34; x=4842.32, y=5539.578; stony grassland
249. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; Kapelica; 5-15 m a.s.l.; WJ34; x=4842.276, y=5539.174; stony grassland

250. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; 1-10 m a.s.l.; WJ34; x=4842.648, y=5538.802; rocks, dry stone wall
251. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; Veli vrh; 2-20 m a.s.l.; WJ34; x=4842.936, y=5538.87; rocks
252. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; 65 m a.s.l.; WJ34; x=4842.928, y=5538.409; dry stone wall
253. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; Veli vrh; 5-40 m a.s.l.; WJ34; x=4843.32, y=5538.606; rocks
254. Smokvica Vela (islet) [VAH: »Vela Smokvica«]; 2-20 m a.s.l.; WJ34; x=4843.208, y=5538.458; dry stone wall, rocks, garden
255. Kurba Vela (islet) [NPK: »Kurba«]; rt Kurba; 20 m a.s.l.; WJ34; x=4840.764, y=5538.216; semi-cave
256. Kurba Vela (islet) [NPK: »Kurba«]; rt Kurba; 20 m a.s.l.; WJ34; x=4840.668, y=5538.266; rocks
257. Kurba Vela (islet) [NPK: »Kurba«]; rt Kurba-Gravrnjača (brdo); 20 m a.s.l.; WJ33; x=4840.668, y=5538.422; stony grassland
258. Kurba Vela (islet) [NPK: »Kurba«]; Gravrnjača; 60-78 m a.s.l.; WJ33; x=4840.32, y=5538.65; stony grassland
259. Kurba Vela (islet) [NPK: »Kurba«]; Vlah; 50 m a.s.l.; WJ43; x=4839.84, y=5539.202; rocks
260. Kurba Vela (islet) [NPK: »Kurba«]; Debela prisliga; 20 m a.s.l.; WJ33; x=4839.704, y=5539.374; next to the house and dry stone wall
261. Kurba Vela (islet) [NPK: »Kurba«]; Debela prisliga; 1-30 m a.s.l.; WJ33; x=4839.32, y=5539.454; stony grassland
262. Kurba Vela (islet) [NPK: »Kurba«]; Komornjak; 40-50 m a.s.l.; WJ33; x=4839.448, y=5539.674; stony grassland
263. Kurba Vela (islet) [NPK: »Kurba«]; Komornjak; 74 m a.s.l.; WJ33; x=4839.48, y=5539.822; pit
264. Kurba Vela (islet) [NPK: »Kurba«]; Visočan; 60 m a.s.l.; WJ33; x=4839.376, y=5540.268; stony grassland
265. Kurba Vela (islet) [NPK: »Kurba«]; Visočan; 106 m a.s.l.; WJ33; x=4839.254, y=5540.35; stony grassland
266. Kurba Vela (islet) [NPK: »Kurba«]; Orljak; 100 m a.s.l.; WJ43; x=4838.75, y=5541.31; rocks
267. Kurba Vela (islet) [NPK: »Kurba«]; Orljak; 40 m a.s.l.; WJ43; x=4838.598, y=5541.39; stony grassland
268. Kurba Vela (islet) [NPK: »Kurba«]; Južna glava; 90-117 m a.s.l.; WJ43; x=4838.558, y=5541.878; stony grassland
269. Kurba Vela (islet) [NPK: »Kurba«]; Južna glava; 80-117 m a.s.l.; WJ43; x=4838.454, y=5541.782; stony grassland
270. Kurba Vela (islet) [NPK: »Kurba«]; rt Mede; 60 m a.s.l.; WJ43; x=4838.398, y=5542.038; rocks, exp.SW
271. Kurba Vela (islet) [NPK: »Kurba«]; rt Mede; 50-60 m a.s.l.; WJ43; x=4838.414, y=5542.166; rocks, exp.NE
272. Kurba Vela (islet) [NPK: »Kurba«]; rt Mede; 20 m a.s.l.; WJ43; x=4838.29, y=5542.246; semi-cave
273. Svršata Mala (islet) [VAH: »Mala Svršata«]; 15-18 m a.s.l.; WJ25; x=4857.158, y=5523.43; stony grassland
274. Svršata Vela (islet) [NPK: »Svršata«; VAH: »Vela Svršata«]; SE summit; 30 m a.s.l.; WJ25; x=4857.198, y=5522.774; stony grassland
275. Svršata Vela (islet) [NPK: »Svršata«; VAH: »Vela Svršata«]; NW summit; 30 m a.s.l.; WJ25; x=4857.742, y=5522.274.

LIST OF TAXA WITH FINDING SITES

The list includes all species and subspecies found during our field survey that certainly inhabit Kornati National Park and were not washed up by the sea, as well as taxa recorded as inhabiting the study area in the literature. Taxa are listed in order according to ŠTAMOL (2010). After the name of the taxon, and synonyms from the literature, the finding localities from the present field survey are listed and marked by number, according to the »List of sites«. The first 68 names, written in black, indicate localities on Kornat island, while numbers **69–275**, given in red colour, indicate localities on islets within Kornati National Park. Individuals that could not be determined to species level due to immaturity or the inability to differentiate them from closely related species, are reported only to the genus or family level. A question mark in front of the taxon name indicates uncertainty of determination. Literature data are cited after the letter **L**. If the name of a locality differs from the name used as valid in this paper, the literature toponym is cited first, followed by the name of the valid toponym from the list of sites in square brackets.

1. *Cochlostoma* (*Cochlostoma*) *scalarinum scalarinum* (A. & B. J. Villa, 1841)
Cochlostoma scalarinum Villa. – KUŠČER, 1930: 33

1, 3, 4, 6, 7, 9, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 33, 35, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 62, 63, 64, 65, 66, 67, 68, **69**, **70**, **71**, **72**, **73**, **74**, **75**, **76**, **77**, **78**, **79**, **80**, **81**, **82**, **83**, **84**, **85**, **86**, **87**, **88**, **89**, **90**, **91**, **92**, **93**, **94**, **95**, **96**, **97**, **99**, **100**, **101**, **102**, **103**, **104**, **105**, **106**, **107**, **108**, **109**, **110**, **111**, **113**, **114**, **115**, **116**, **117**, **118**, **120**, **121**, **122**, **123**, **124**, **125**, **126**, **127**, **128**, **129**, **130**, **131**, **132**, **133**, **134**, **135**, **136**, **137**, **138**, **139**, **140**, **141**, **142**, **143**, **144**, **145**, **146**, **147**, **149**, **150**, **152**, **153**, **154**, **155**, **156**, **157**, **158**, **159**, **160**, **161**, **162**, **162**, **163**, **164**, **166**, **167**, **168**, **169**, **170**, **171**, **172**, **175**, **176**, **177**, **178**, **179**, **180**, **181**, **182**, **183**, **184**, **185**, **186**, **187**, **188**, **189**, **190**, **191**, **193**, **194**, **195**, **197**, **200**, **201**, **204**, **205**, **206**, **207**, **208**, **209**, **210**, **211**, **212**, **213**, **214**, **215**, **216**, **217**, **220**, **221**, **224**, **225**, **226**, **227**, **228**, **229**, **230**, **231**, **232**, **233**, **235**, **236**, **238**, **241**, **242**, **245**, **249**, **250**, **251**, **252**, **253**, **254**, **255**, **256**, **257**, **258**, **259**, **260**, **261**, **262**, **263**, **264**, **265**, **266**, **267**, **268**, **269**, **270**, **271**, **272**, **273**, **274**, **275**.

L: KUŠČER, 1930: 33: »Toreta« [=Toreta, Kornat]; »Mrtvac« [=Mrtovac (Mrtvac)]; »Borovnik«.

2. *Pomatias elegans* (O. F. Müller, 1774)
Pomatias elegans Müll. – KUŠČER, 1930: 33

3, 6, 7, 13, 15, 16, 18, 19, 20, 22, 23, 24, 25, 26, 28, 30, 35, 36, 37, 38, 39, 40, 41, 42, 44, 45, 47, 47, 49, 50, 51, 52, 52, 53, 54, 56, 57, 59, 62, 63, 64, 66, 67, 68, **71**, **72**, **73**, **74**, **76**, **84**, **85**, **86**, **87**, **88**, **91**, **92**, **96**, **97**, **99**, **100**, **101**, **103**, **104**, **105**, **110**, **113**, **114**, **115**, **116**, **117**, **118**, **119**, **121**, **122**, **124**, **125**, **126**, **127**, **128**, **131**, **132**, **133**, **135**, **136**, **138**, **139**, **140**, **141**, **142**, **145**, **146**, **147**, **149**, **150**, **152**, **153**, **154**, **155**, **156**, **161**, **162**, **164**, **167**, **168**, **176**, **177**, **180**, **181**, **182**, **183**, **185**, **186**, **187**, **188**, **189**, **191**, **193**, **194**, **195**, **197**, **199**, **200**, **201**, **205**, **206**, **207**, **208**, **209**, **210**, **211**, **212**, **213**, **214**, **215**, **217**, **220**, **221**, **222**, **223**, **224**, **226**, **227**, **228**, **229**, **230**, **231**, **232**, **233**, **234**, **235**, **236**, **237**, **238**, **239**, **240**, **241**, **242**, **244**, **245**, **246**, **247**, **248**, **249**, **251**, **253**, **254**, **255**, **256**, **257**, **258**, **259**, **260**, **261**, **262**, **263**, **264**, **267**, **268**, **270**, **272**, **273**, **274**, **275**.

L: KUŠČER, 1930: 33/34: »Kornat«; »Trbuh« [=Obučan mali]; »Purara«.

3. *Cecilioides* (*Cecilioides*) *acicula* (O. F. Müller, 1774)

11, 13, 16, 20, 22, 40, 44, 47, 50, 59, **78**, **79**, **104**, **175**, **250**, **273**, **275**.

4. *Cecilioides* (*Cecilioides*) *veneta* (Strobel, 1855)

175.

Cecilioides sp.

1, **70**, **206**, **211**.

5. *Rumina decollata* (Linnaeus, 1758)

Rumina decollata L. – KUŠČER, 1930: 36

166, 176, 183, 193, 226, 227, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247.

L: KUŠČER, 1930: 36: »Purara«.

6. *Charpentieria* (*Gibularia*) *gibbula gibbula* (Rossmässler, 1836)

3, 36, 37, **166**.

7. *Delima* (*Delima*) *albocincta albocincta* (L. Pfeiffer, 1841)

Delima albocincta Pfr. – KUŠČER, 1930: 34

18, 19, 20, 25, 62, 64, 67, 68, **71**, **72**, **78**, **86**, **87**, **88**, **89**, **90**, **91**, **92**, **93**, **94**, **95**, **99**, **101**, **106**, **108**, **109**, **110**, **111**, **113**, **114**, **115**, **132**, **133**, **135**, **136**, **137**, **138**, **139**, **140**, **142**, **143**, **157**, **158**, **160**, **161**, **162**, **163**, **164**, **171**, **172**, **173**, **174**, **175**, **176**, **181**, **183**, **184.**

L: KUŠČER, 1930: 34: »Kornat«; »Obručan« [=Obručan veli]; »Levrnaka«.

8. *Delima* (*Semirugata*) *bilabiata alschingeri* (Charpentier, 1852)

Delima alschingeri Charp. – KUŠČER, 1930: 35

1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 27, 28, 29, 30, 31, 34, 35, 36, 37, 39, 40, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, **69**, **71**, **72**, **74**, **75**, **76**, **77**, **78**, **81**, **82**, **84**, **86**, **87**, **88**, **89**, **90**, **91**, **92**, **93**, **94**, **95**, **96**, **97**, **98**, **101**, **102**, **103**, **104**, **105**, **106**, **107**, **108**, **109**, **110**, **111**, **112**, **114**, **115**, **116**, **119**, **120**, **121**, **122**, **123**, **124**, **125**, **130**, **131**, **132**, **133**, **134**, **137**, **138**, **139**, **140**, **141**, **142**, **143**, **147**, **149**, **150**, **151**, **152**, **157**, **158**, **159**, **160**, **161**, **162**, **163**, **164**, **165**, **166**, **168**, **169**, **170**, **171**, **172**, **173**, **174**, **175**, **176**, **177**, **179**, **180**, **181**, **183**, **184**, **185**, **186**, **187**, **190**, **191**, **192**, **194**, **195**, **196**, **197**, **198**, **199**, **200**, **201**, **202**, **203**, **204**, **205**, **206**, **207**, **209**, **210**, **211**, **212**, **213**, **216**, **217**, **221**, **222**, **223**, **225**, **226**, **227**, **228**, **229**, **230**, **231**, **232**, **233**, **234**, **235**, **236**, **237**, **238**, **239**, **240**, **241**, **242**, **243**, **244**, **245**, **246**, **247**, **248**, **249**, **250**, **251**, **252**, **253**, **254**, **256**, **257**, **258**, **259**, **260**, **262**, **270**, **271**, **272**, **274**, **275.**

L: KUŠČER, 1930: 35: »Toreta« [=Toreta, Kornat]; »Kornat«; »Trbuh« [=Obručan mali]; »Obručan« [=Obručan veli]; »Mrtvac« [=Mrtovac (Mrtvac)].

9. *Delima* (*Semirugata*) *vidovichii robusta* (Küster, 1847)

247.

Delima sp.

40, **85**, **177**, **225**, **227**, **247**, **263**.

10. *Agathylla* (*Agathyllina*) *lamellosa* (J. A. Wagner, 1829)

140, **142**, **143.**

11. *Hypnophila pupaeformis* (Cantraine, 1836)

1, 3, 6, 13, 14, 16, 18, 19, 20, 22, 23, 25, 28, 30, 35, 37, 38, 40, 41, 43, 44, 44, 45, 47, 49, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 64, 66, 67, 68, **69**, **70**, **71**, **72**, **73**, **74**, **75**, **76**, **77**, **78**, **79**, **84**, **85**, **86**, **87**, **88**, **90**, **91**, **94**, **95**, **96**, **97**, **99**, **100**, **101**, **103**, **104**, **105**, **106**, **107**, **108**, **109**, **110**, **111**, **113**, **114**, **116**, **117**, **118**, **122**, **127**, **128**, **129**, **130**, **131**, **132**, **133**, **136**, **138**, **139**, **140**, **142**, **143**,

144, **145**, **146**, **147**, **149**, **150**, **152**, **153**, **154**, **156**, **157**, **158**, **160**, **161**, **162**, **163**, **164**, **165**, **168**, **171**, **172**, **174**, **175**, **176**, **177**, **178**, **179**, **180**, **181**, **183**, **185**, **186**, **188**, **189**, **190**, **191**, **193**, **194**, **197**, **199**, **200**, **201**, **203**, **204**, **205**, **206**, **207**, **208**, **209**, **210**, **211**, **212**, **213**, **214**, **217**, **220**, **221**, **224**, **225**, **226**, **228**, **229**, **230**, **231**, **232**, **233**, **236**, **238**, **241**, **247**, **249**, **250**, **251**, **252**, **254**, **255**, **256**, **258**, **259**, **260**, **261**, **262**, **263**, **263**, **265**, **266**, **268**, **270**, **271**, **272**, **273**, **275**.

12. *Chondrula quinquedentata quinquedentata* (Rossmässler, 1837)

138, **139**, **151**, **152**, **196**, **228**, **230**, **232**, **237**, **238**, **239**, **244**, **246**, **247**, **254**.

13. *Chondrula tridens eximia* (Rossmässler, 1835)

72, **275**.

Chondrula sp.

69, **78**, **79**, **196**.

14. *Pseudochondrula seductilis seductilis* (Rossmässler, 1837)
Jaminia seductilis R. – KUŠČER, 1930: 34

10, 16, 21, 27, 31, 34, 46, 48, 50, 51, 52, **92**, **120**, **122**, **123**, **124**, **134**.

L: KUŠČER, 1930: 34: »Toreta« [=Toreta, Kornat]; »Mrtvac« [=Mrtovac (Mrtvac)].

Oxychilus sensu lato sp.

10, 18, 23, 25, 32, 33, 37, 47, 56, **72**, **182**, **185**, **200**, **215**, **216**, **220**, **224**, **264**, **273**.

15. *Vitrea botterii* (L. Pfeiffer, 1853)

1, 5, 7, 9, 11, 12, 14, 16, 22, 23, 28, 34, 37, 38, 39, 40, 41, 44, 47, 49, 50, 51, 53, 55, 66, **73**, **74**, **75**, **76**, **78**, **84**, **89**, **92**, **94**, **95**, **96**, **97**, **99**, **100**, **101**, **102**, **106**, **107**, **108**, **109**, **110**, **111**, **113**, **114**, **115**, **116**, **117**, **120**, **121**, **122**, **124**, **125**, **127**, **128**, **130**, **131**, **132**, **133**, **139**, **140**, **141**, **142**, **143**, **144**, **145**, **150**, **152**, **153**, **154**, **156**, **164**, **166**, **167**, **169**, **170**, **175**, **180**, **185**, **186**, **212**, **251**, **252**, **264**, **268**, **269**.

16. *Vitrea subrimata* (Reinhardt, 1871)

11, 21, 23, 25, 28, 37, 39, 40, 41, 45, 46, 47, 53, 58, 59, 61, 62, 64, 65, 67, **69**, **70**, **71**, **72**, **74**, **76**, **88**, **94**, **103**, **119**, **122**, **124**, **125**, **126**, **128**, **130**, **131**, **133**, **134**, **135**, **136**, **141**, **142**, **149**, **150**, **152**, **160**, **161**, **165**, **175**, **177**, **178**, **179**, **182**, **185**, **188**, **190**, **191**, **193**, **194**, **199**, **200**, **202**, **203**, **204**, **205**, **206**, **209**, **210**, **211**, **212**, **214**, **215**, **216**, **217**, **220**, **221**, **224**, **226**, **227**, **232**, **233**, **238**, **241**, **242**, **244**, **245**, **246**, **247**, **250**, **251**, **252**, **254**, **257**, **259**, **260**, **262**, **269**, **270**, **271**, **273**, **274**.

Vitrea sp.

54, **193**, **266**.

17. *Chilostoma* (*Liburnica*) *setosa setosa* (A. Férussac, 1832)
Campylaea setosa R. – KUŠČER, 1930: 36

18, 19, 20, 23, 25, 47, **153**, **156**, **192**, **233**, **235**, **236**, **241**, **259**, **263**, **265**, **268**, **270**, **272**, **273**.

L: KUŠČER, 1930: 36: Kornat.

18. *Cornu aspersum aspersum* (O. F. Müller, 1774)

1, 36, **166**.

19. *Eobania vermiculata vermiculata* (O. F. Müller, 1774)

1, 3, 6, 11, 22, 34, 36, 37, 39, 47, 52, 53, 57, 60, 61, 63, **72**, **76**, **83**, **84**, **85**, **86**, **87**, **88**, **92**, **93**, **98**, **111**, **112**, **113**, **116**, **117**, **118**, **119**, **122**, **123**, **124**, **125**, **126**, **128**, **129**, **130**, **131**, **133**, **135**, **136**, **137**, **138**, **139**, **141**, **149**, **150**, **153**, **156**, **157**, **158**, **162**, **163**, **164**, **165**, **166**, **171**, **172**, **174**, **176**, **177**, **178**, **179**, **180**, **181**, **182**, **183**, **188**, **193**, **196**, **199**, **200**, **201**, **205**, **216**, **217**, **220**, **221**, **222**,

223, **224**, **226**, **227**, **231**, **233**, **234**, **235**, **236**, **237**, **238**, **239**, **240**, **243**, **244**, **245**, **246**, **247**, **248**, **249**, **250**, **253**, **254**.

20. *Helix* (*Helix*) *cincta cincta* O. F. Müller, 1774
Helix cincta Brum. – KUŠČER, 1930: 37

1, 3, 5, 6, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 27, 36, 37, 39, 40, 43, 44, 45, 46, 47, 48, 50, 52, 53, 56, 61, 66, **72**, **84**, **162**, **165**, **250**.

L: KUŠČER, 1930: 37: »Toreta« [=Toreta, Kornat]; »Kornat«.

21. *Helix* (*Helix*) *secernenda* Rossmässler, 1847
Helix secernenda R. – KUŠČER, 1930: 37

11, 41, 62.

L: KUŠČER, 1930: 37: »Kornat«.

Helix sp.

25, 32, 40, 62, **88**, **103**, **122**.

Lindholmiola corcyrensis (Rossmässler, 1838)
Helix (Gonostoma) corcyrensis Partsch. – STROBEL, 1854: 116; BIELZ, 1865: 179

L: STROBEL, 1854:116: »Insel Incoronata« [=Kornat]; BIELZ, 1865: 179: »Insel Incoronata« [=Kornat].

22. *Cernuella* (*Cernuella*) *cisalpina cisalpina* (Rossmässler, 1837)

250.

23. *Cernuella* (*Cernuella*) *virgata* (Da Costa, 1778)

5, 6, 11, 16, **73**, **112**, **157**, **233**, **235**, **238**, **239**, **240**, **242**.

24. *Monacha* (*Monacha*) *cartusiana* (O. F. Müller, 1774)
Theba carthusiana Müll. – KUŠČER, 1930: 36

1, 2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 19, 21, 27, 34, 35, 37, 40, 43, 45, 48, 50, 52, 61, 65, **70**, **71**, **74**, **75**, **77**, **78**, **79**, **84**, **85**, **98**, **103**, **105**, **107**, **108**, **109**, **110**, **117**, **127**, **130**, **133**, **134**, **151**, **152**, **165**, **168**, **175**, **196**, **203**, **204**, **231**, **233**, **235**, **250**, **274**, **275**

L: KUŠČER, 1930: 36: »Toreta« [=Toreta, Kornat]; »Kornat«; »Borovnik«.

25. *Monacha* (*Monacha*) *parumcincta* (Menke, 1828)
Theba olivieri Roth. – KUŠČER, 1930: 36

3, 7, 11, 13, 19, 21, 22, 23, 24, 28, 29, 30, 37, 39, 40, 41, 42, 44, 45, 47, 49, 50, 53, 56, 58, 59, 62, 67, 68, **70**, **72**, **73**, **81**, **82**, **89**, **90**, **93**, **94**, **96**, **98**, **99**, **101**, **103**, **104**, **108**, **112**, **114**, **115**, **117**, **118**, **119**, **120**, **121**, **122**, **124**, **126**, **128**, **129**, **135**, **136**, **141**, **142**, **145**, **146**, **149**, **150**, **151**, **152**, **154**, **155**, **156**, **158**, **160**, **161**, **164**, **167**, **169**, **170**, **180**, **185**, **187**, **188**, **189**, **190**, **191**, **192**, **193**, **194**, **195**, **196**, **198**, **199**, **205**, **206**, **207**, **208**, **209**, **210**, **211**, **213**, **215**, **216**, **217**, **220**, **221**, **224**, **225**, **226**, **228**, **230**, **232**, **237**, **238**, **242**, **245**, **248**, **249**, **250**, **251**, **252**, **253**, **254**, **256**, **257**, **258**, **260**, **261**, **262**, **263**, **267**, **270**, **272**, **273**, **275**.

L: KUŠČER, 1930: 36: »Obručan« [=Obručan veli].

Monacha sp.

10, 15, 18, 25, 32, 33, 38, 41, 51, 52, 63, 64, 66, **80**, **87**, **91**, **92**, **106**, **113**, **139**, **140**, **143**, **147**, **153**, **157**, **159**, **162**, **167**, **178**, **201**, **202**, **214**, **255**, **271**.

Helicidae sensu lato sp.

110.

26. *Punctum* (*Punctum*) *pygmaeum* (Draparnaud, 1801)

18, **76**, **128**, **147**.

27. *Chondrina spelta ventilatoris* (Westerlund, 1875)

Chondrina mühlfeldti Brug. – KUŠČER, 1930: 34

18, 19, 20, 23, 25, 26, 30, 32, 62, **89**, **92**, **94**, **95**, **96**, **97**, **99**, **101**, **211**.

L: KUŠČER, 1930: 34: »Kornat«.

28. *Granaria illyrica illyrica* (Rossmässler, 1835)

Abida frumentum illyrica R. – KUŠČER, 1930: 34

3, 5, 7, 8, 10, 11, 12, 13, 16, 19, 20, 21, 22, 24, 27, 28, 31, 34, 35, 37, 39, 42, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 55, 56, 58, 62, 63, 64, 65, 66, 67, **71**, **72**, **75**, **76**, **80**, **81**, **82**, **83**, **84**, **85**, **86**, **90**, **91**, **92**, **94**, **95**, **96**, **97**, **101**, **102**, **103**, **104**, **105**, **106**, **111**, **113**, **114**, **115**, **116**, **117**, **118**, **119**, **120**, **121**, **122**, **123**, **124**, **126**, **128**, **130**, **131**, **132**, **133**, **137**, **138**, **139**, **140**, **142**, **143**, **149**, **150**, **151**, **152**, **153**, **154**, **157**, **158**, **162**, **163**, **164**, **167**, **168**, **169**, **170**, **175**, **177**, **178**, **180**, **181**, **182**, **183**, **185**, **187**, **188**, **189**, **191**, **194**, **195**, **197**, **199**, **200**, **201**, **205**, **206**, **209**, **210**, **211**, **212**, **213**, **214**, **215**, **217**, **220**, **221**, **222**, **227**, **228**, **229**, **230**, **231**, **232**, **233**, **234**, **235**, **236**, **237**, **238**, **239**, **241**, **242**, **244**, **245**, **247**, **251**, **253**, **255**, **256**, **257**, **258**, **259**, **260**, **261**, **262**, **263**, **266**, **267**, **269**, **271**, **272**, **274**, **275**.

L: KUŠČER, 1930: 34: »Kornat«; »Trbuh« [=Obručan mali]; »Purara«.

29. *Granopupa granum* (Draparnaud, 1801)

5, 8, 10, 11, 16, 48, 50, 56, 61, 62, 63, 64, 65, **81**, **82**, **89**, **94**, **111**, **119**, **120**, **164**, **165**, **175**, **181**, **187**, **192**, **194**, **196**, **198**, **206**, **217**, **250**, **257**, **260**, **261**, **263**, **265**, **266**, **271**.

30. *Rupestrella philippii philippii* (Cantraine, 1840)

13, 19, 40, 47, 58, 59, 62, 64, 66, 67, **71**, **72**, **75**, **89**, **90**, **99**, **156**, **175**.

31. *Rupestrella rhodia* (Roth, 1839)

4, 7, 8, 9, 11, 13, 14, 18, 19, 21, 22, 23, 26, 28, 29, 30, 31, 35, 37, 39, 40, 41, 42, 43, 44, 45, 47, 49, 51, 52, 54, 56, 59, 62, 64, 66, 68, **70**, **71**, **72**, **73**, **74**, **75**, **77**, **78**, **79**, **90**, **94**, **95**, **103**, **104**, **105**, **107**, **114**, **115**, **117**, **122**, **127**, **128**, **130**, **133**, **139**, **152**, **153**, **154**, **156**, **165**, **169**, **175**, **178**, **181**, **183**, **185**, **186**, **188**, **190**, **191**, **194**, **195**, **197**, **204**, **205**, **208**, **209**, **210**, **211**, **213**, **214**, **220**, **221**, **224**, **225**, **226**, **231**, **250**, **251**, **252**, **256**, **259**, **270**, **274**, **275**.

Rupestrella sp.

25, **129**.

32. *Lauria (Lauria) cylindracea* (Da Costa, 1778)

1, 3, 8, 11, 18, 19, 22, 25, 37, 43, 62, **77**, **88**, **128**, **165**, **166**, **238**, **255**, **260**, **264**, **271**.

33. ? *Lauria (Lauria) sempronii* (Charpentier, 1837)

16, 32, 47, 39, 45, 52.

Lauria sp.

9, **220**, **255**, **268**.

34. *Pyramidula rupestris* (Draparnaud, 1801)

9, 45.

35. *Acanthinula aculeata* (O. F. Müller, 1774)

18, 32, 33.

36. *Truncatellina callicratis* (Scacchi, 1833)

1, 5, 13, 18, 20, 22, 23, 24, 25, 26, 30, 37, 40, 47, 49, 59, 62, 61, **71**, **76**, **87**, **92**, **101**, **110**, **114**, **122**, **128**, **129**, **130**, **131**, **140**, **145**, **150**, **152**, **160**, **166**, **168**, **177**, **184**, **185**, **193**, **194**, **196**, **198**, **215**, **217**, **220**, **227**, **228**, **232**, **238**, **250**, **252**, **256**, **258**, **264**, **265**, **266**, **269**, **273**.

Truncatellina sp.

52.

38. *Poiretia cornea* (Brumati, 1838)

Poiretia algira L. – KUŠČER, 1930: 36

1, 3, 5, 6, 8, 11, 13, 14, 15, 16, 19, 20, 20, 21, 22, 23, 25, 26, 34, 35, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 52, 52, 52, 53, 54, 56, 57, 58, 59, 62, 62, 61, 63, 64, 65, 66, 67, 68, **70**, **71**, **73**, **74**, **75**, **76**, **78**, **79**, **81**, **89**, **92**, **93**, **94**, **95**, **96**, **97**, **99**, **101**, **103**, **104**, **105**, **107**, **108**, **110**, **114**, **115**, **117**, **118**, **126**, **127**, **128**, **130**, **132**, **133**, **140**, **141**, **142**, **143**, **145**, **146**, **150**, **152**, **153**, **154**, **155**, **156**, **165**, **168**, **175**, **177**, **178**, **180**, **185**, **188**, **189**, **190**, **191**, **193**, **194**, **196**, **201**, **204**, **205**, **206**, **207**, **208**, **209**, **210**, **211**, **212**, **213**, **214**, **215**, **216**, **217**, **220**, **221**, **224**, **226**, **227**, **228**, **229**, **230**, **231**, **232**, **237**, **238**, **250**, **254**, **255**, **257**, **258**, **259**, **260**, **262**, **263**, **266**, **270**, **272**, **273**, **275**.

L: KUŠČER, 1930: 36: »Obručan« [=Obručan veli].

In all above-sea terrestrial units of Kornati National Park investigated in this field survey, 39 species of terrestrial snails were found, and of these 38 taxa could be defined to species and subspecies level. The genus *Oxychilus*, whose taxa are difficult to distinguish based on shells alone, was not determined to species level and this genus is represented with a minimum of one species. Though surveys were conducted of speleological features, no troglobiont snails were found, only members of the above-ground fauna. The literature data indicate 15 taxa of terrestrial snails inhabiting the area of Kornati National Park, less than half the taxa found during the current study. STROBEL (1854) and BIELZ (1865) list only one species, but this report was the result of accidental collection. KUŠČER (1930) reports 14 species of terrestrial snails for Kornati National Park collected during a targeted fauna survey of Kornati archipelago. According to the collection dates listed (KUŠČER, 1930), it is noted that the collection on Kornat island and on six islets visited in Kornati National Park lasted only two days. This is too short a time for the study area to be systematically investigated, even today, with the possibilities of fast sea transport. It is assumed that the sampling methods were not adequate (it is likely that soil samples were not taken), as the snails reported do not include any of the small species that live in the soil. Therefore, this survey (KUŠČER, 1930), intended to study the fauna of Kornati archipelago systematically, did not fully live up to the task due to the short study period and lack of adequate collection methods. Nonetheless, the paper represents an important contribution to the knowledge of the malacofauna of this area.

The only species listed as inhabiting Kornati National Park not found in the present study was *Lindholmiola corcyrensis*. BANK (2011) reports this species in Croatia, Montenegro, Albania, Macedonia, Greece and Italy. It should be stated that there are different opinions regarding the ranges of the related species *L. corcyrensis* and *L. girva* (Frivaldsky, 1835), though these differences do not affect the issue to be

resolved here: the presence of *L. corcyrensis* on the Kornati islands and in Croatia. According to the available literature, *Lindholmiola corcyrensis* is reported as present in Croatia in southern Dalmatia, for Dubrovnik (STROBEL, 1854: 116; BIELZ, 1865: 179) and Lokrum Island (BRUSINA, 1866: [121]), in central Dalmatia for Hvar Island (STROBEL, 1854: 116; BIELZ, 1865: 179; WESTERLUND, 1889: 19) and in Kvarner Bay on the island Vele Orjule (FRANK, 1991: 373). All other claims for Croatia are due to sea tides (BRUSINA, 1872: 150; REISCHÜTZ & REISCHÜTZ, 2000: 64; ŠTAMOL, 2004: 106; MAASSEN, 2005: 53) and therefore cannot be evidence of the presence of the species in Croatia. However, it is questionable whether the authors always warned about cases of sea tides, and therefore, it is questionable as to whether the finds in Croatia in the cited papers (STROBEL, 1854: 116; BIELZ, 1865: 179; BRUSINA, 1866: [121]; WESTERLUND, 1889: 19; FRANK, 1991: 373) are data that undoubtedly indicate that a species inhabits a given area. ŠTAMOL (2010) records *Lindholmiola corcyrensis* as a certain species in Croatia based on the literature data. BANK (2011) also gives the distribution range based on the literature data. According to our investigation of the neighbouring island of Dugi otok, where specimens of *Lindholmiola corcyrensis* were found washed up by the sea and individuals were not found in the surrounding area out of reach of the sea, despite detailed searches, it is concluded that this species does not inhabit Dugi otok (ŠTAMOL, 2004). Therefore, we believe according to

Fig. 6a-b. a) *Agathylla lamellosa*, formerly a strictly southern Dalmatian species that was recently discovered on Dugi otok, and now on the Kornati; b) *Delima albocincta albocincta* a species endemic to Dugi otok, Ugljan and Kornat (photos: E. Kletečki).

our studies in Kornati National Park, that *Lindholmiola corcyrensis* is not a resident of Kornat island, but was washed up there. We are inclined to believe that this species is not a resident species in Croatia, though only new research into other coastal areas and islands of the Croatian Adriatic will give a final verdict on this matter.

There are several interesting finds in the terrestrial malacofauna of Kornati National Park: i) *Delima albocincta albocincta* (Fig. 6b), endemic to Dugi otok, Ugljan, Kornati archipelago and the accompanying coastal area, ii) *Agathylla lamellosa* (Fig. 6a) which in Croatia was only known to inhabit the southern parts of Dalmatia, while in 2004 a find was listed for the southern part of Dugi otok (ŠTAMOL, 2004), which is the northernmost point not only for the species but also for the genus *Agathylla*, approximately 170 km outside of its previously known range (ŠTAMOL, 2004; ŠTAMOL & KLETEČKI, 2005). Our find of this species on the islet Piškera in Kornati National Park is the second find within the northern part of the disjunctive species range, and about 18 km south of the find on Dugi otok; iii) *Delima vidovichii robusta*, a species found on the islet Babina Guzica is the northernmost find, about 50 km outside of its previously known distribution range; iv) *Lauria sempronii*, a rare taxon in the Croatian fauna, to date reported in Croatia at just four localities, i.e. three in Istria and one in southern Dalmatia (BLUM, 1888; STOSSICH, 1899; MAASSEN, 1993; WAGNER, 1932; REISCHÜTZ & REISCHÜTZ, 2002). The find of *Lauria sempronii* on Kornat would be the link between these two areas.

According to our field studies, 31 species inhabit Kornat island, and 34 species of terrestrial snails inhabit the islets of Kornati National Park. Previous publications listed 12 species of terrestrial snails on Kornat island (STROBEL, 1854; BIELZ, 1865; KUŠČER, 1930). As explained above, we believe that the species *Lindholmiola corcyrensis*, reported for Kornat island by STROBEL (1854) and BIELZ (1865), was in tidal material, and that this species is not resident. With that, the number of species reported for Kornat island has been virtually tripled with the present study.

The literature data for terrestrial snails on the islets of Kornati National Park pertain only to six islets, or one-fourteenth of the islets, and 10 taxa are reported (KUŠČER, 1930). Therefore, with the present study, the number of terrestrial snail taxa on the islets of Kornati National Park has been more than tripled. If we compare the literature data and the results of this study by individual islet, then the number of »literature« species on each of the six islets has been substantially increased (Tab. 1).

There are four species that inhabit Kornat island and that were not found on the islets of Kornati National Park (*Helix secernenda*, *Lauria sempronii*, *Pyramidula rupestris*, *Acanthinula aculeata*), and seven taxa of terrestrial snails that were not found on Kornat island, but were found on one or more of the islets in Kornati National Park (*Cecilioides veneta*, *Rumina decollata*, *Delima vidovichii robusta*, *Agathylla lamellosa*, *Chondrula quinquedentata quinquedentata*, *Chondrula tridens eximia*, *Cernuella cisalpina cisalpina*). The reasons for this are difficult to ascertain. We assume that there are appropriate habitats on Kornat island for these seven species. It is possible that they inhabit Kornat island but were not found due to their rare local presence. The chances of finding species on the islets was greater, as there were almost three times as many research localities on the islands, although the total surface area of the islets is not quite half that of Kornat island (in order to ensure equal sampling intensity in relation to area size for both Kornat island and the islets, a total of 390

Tab. 1. Kornat island and the islets of Kornati National Park for which there are literature data on terrestrial snails; LIT. species – number of species recorded in the literature; FIELD species – number of species found in our field survey by island/islet.

name	LIT. species	FIELD species
Kornat	12	31
Obručan mali	3	12
Mrtvac	3	12
Obručan veli	4	13
Levrnaka	1	17
Borovnik	2	9
Purara	3	10

sampling sites would be required on Kornat island). For the four taxa found on Kornat island which are missing from the islets, the reasons may differ. It is possible that *Helix secernenda*, which typically inhabits higher altitudes, and *Acanthinula aculeata*, which is found in forest stands, do not have adequate habitats on the islets. As previously stressed, we are not certain that *Lauria semronii* was accurately determined, and therefore it is possible that these are smaller and slightly different specimens of the variable species *L. cylindracaea*, which was found both on the islets and on Kornat island. *Pyramidula rupestris* was found at only two localities on Kornat island, and in both of them in small numbers. We assume that it is more common and that adequate research methods were not applied during collection. This could also be a reason why it was not found on the islets. However, the possibility cannot be excluded that this species may actually be rare within Kornati National Park, and that it is difficult or impossible to find at other localities. The observations of SUBAI (2009: 111/112) on snails in southern Montenegro could favour this opinion, giving a comparison of the state of populations over the past 35 years, stating that »...unfortunately it has to be noted that in general, snail populations are declining« and that of »...species, which previously were known to be distributed over larger areas and occured in large numbers such as *Pyramidula* ssp. and *Rupestrella* ssp., only shells isolated in rock duff could be found«. Our observations in long-term visited localities in central Dalmatia and discussions with the locals of central Dalmatia and the Croatian Littoral (Hrvatsko primorje), who led us to rocky areas they remembered to have been crawling with snails of the genus *Delima* a few decades ago, while now there are only few or no snails to be found, are fully in agreement with the first cited claim made by SUBAI (2009). Considering that the localities in Kornati National Park were visited only once in a three-year period, it is not possible to comment on the reduction of populations of any of the species on the Kornati archipelago, nor to claim that only few findings of a species such as *Pyramidula* is the result of a reduction of the Kornati populations, though such a possibility cannot be excluded.

It is in that regard that the issue of the threat of terrestrial snails is addressed. Though the current appearance of the Kornati islands is the result of anthropogenic influences, they appear both »natural« and »wild«. Development and tourism are restricted by law because the archipelago lies in a protected area. Agriculture is developed in the form of olive groves (vineyards have been abandoned) and sheep

breeding. Olive groves and cultivated fields cover a small surface of the islands, i.e. about 5.15% of Kornat island (internal data of Kornati National Park on cultivated areas obtained from the Kornati National Park Physical Plan, graphical overview, from 2003). It would be good for the local public to be informed about the need to minimize pesticide use, as this could have a negative direct or indirect effect on terrestrial snails. Extensive sheep breeding has been developed here for many centuries, and today it is not present in any measure that could cause significant degradation of existing habitats. The main problem arose when man decided to adapt the Kornati islands for sheep breeding and burned the forests to obtain pastures. It is believed that this process began during the Neolithic age, 4000–7000 B.C. when humans began to settle on the Kornati islands. This practice was continued by the Illyrian and Roman populations, through the Middle Ages to the present day (MATIĆ *et al.*, 2001: 593). In addition to burning, forests were also cut and the wood used for construction and heating. The long-standing, constant and virtually complete destruction of forests meant habitat loss for woodland snails. The tendency today is towards declining livestock keeping, which will lead to the very long-term and gradual overgrowth of the meadow habitats, which ultimately could mean a loss of habitat for the majority of the present day snail species. Therefore, in order to retain the current terrestrial malacofauna, livestock keeping and grazing should be kept at current levels, if not on the entire surface of the Kornat island, then at least on most of its area. Habitats at localities where rare taxa were found, such as *Agathylla lamellosa*, *Delima vidovichii robusta*, *Lauria sempronii*, *Acanthinula aculeata*, *Delima albocincta albocincta*, should be preserved so as to enable their survival. For the time being, this seems feasible, though these habitats can be destroyed by fire or the construction of lighthouses, marinas, small harbours, transmitters or other structures. Some pits in the vicinity of human settlements are used for the disposal of waste, which threatens the fauna in them (fortunately, there are few such pits and the settlements are few and small). For that reason, the local population should be informed of the harmfulness of such practices, and more acceptable alternatives be made available (transport of waste and wool at the time of slaughter and trimming of sheep).

There is no fossil material on the Kornati islands that would allow us to know which species of terrestrial snails existed on these islands while they formed part of the mainland, what happened after the rising of the sea level and formation of the islands, and what happened to the fauna after the burning of forests and domination of the stony pastures. Today's terrestrial malacofauna is composed primarily of residents of rocks and stony pastures. Two taxa can be said to have been spread by humans on the Kornati islands, as they are exclusively found near or within human settlements. These are *Cornu aspersum aspersum*, which was only found at three localities here despite its high abundance on the eastern Adriatic coast, and *Charpentieria gibbula gibbula*, found at four localities. At all localities of *Charpentieria gibbula gibbula*, and at two of three localities of *Cornu aspersum aspersum* it is possible to find closely related species (*Helix cincta cincta* and *Delima bilabiata alschingeri*) that are widely distributed in Kornati National Park. The question arises as to whether the high representation of *Cornu aspersum* in other parts of the Croatian coast is the result of the frequent and long-term activity of humans in transferring snails and creating suitable habitats for them. This raises the question of whether the species *Cornu aspersum* and perhaps also *Charpentieria gibbula* are indigenous to Croatia.

The neighbouring island of Dugi otok, just to the north, is inhabited by 40 taxa of terrestrial snails (ŠTAMOL, 2004; ŠTAMOL & KLETEČKI, 2005). It is assumed that the larger area and greater diversity of habitats are the reasons for the greater number of terrestrial snail species on Dugi otok in comparison to Kornat island.

CONCLUSION

Systematic faunal research of the terrestrial malacofauna of Kornat island and all the islets and rocks within Kornati National Park revealed 39 species of terrestrial snails. Kornat island is inhabited by 31 species of terrestrial snails, while the islets and crags within Kornati National Park are inhabited by 34 species of terrestrial snails. Literature data indicate 15 species for Kornati National Park, with 12 species listed for Kornat island and 10 taxa of terrestrial snails for the islets within the park. With this study, therefore, the species number of the terrestrial malacofauna was at least doubled for this area. We believe that *Lindholmiola corcyrensis* recorded in the literature on Kornat island does not in fact inhabit the island, but was washed up by the sea. *Cornu aspersum aspersum* and *Charpentieria gibbula gibbula* are not indigenous taxa to the Kornati islands, and were spread here by humans. For the door snail *Agathylla lamellosa* found on the islet Piškera is the second find of this species within the recently discovered northern part of the range. The islet Babina Guzica on which *Delima vidovichii robusta* was found is the northernmost locality of this subspecies, 50 km outside of its previously known range. The determination of the species *Lauria sempronii* is questionable, and this would be its fifth find in Croatia. Kornat island has a less diverse terrestrial malacofauna than neighbouring Dugi otok to the north, primarily due to the greater diversity of habitats present on Dugi otok. The terrestrial snail fauna of Kornati National Park is currently not threatened by agriculture, tourism or developmental activities.

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SAŽETAK

Prilog poznavanju kopnenih puževa (Mollusca: Gastropoda terrestria) Nacionalnog parka Kornati (Hrvatska)

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Osamdeset i devet otoka, otočića i hridi NP Kornati (sjeverna Dalmacija, Hrvatska) bili su rijetko i nesustavno malakološki istraživani. U literaturi je zabilježeno 15 vrsta kopnenih puževa unutar Parka, s time da na otoku Kornatu 12, a na 6 otočića (što čini četrnaestinu ukupno postojećih nadmorskih kopnenih jedinica) samo 10 vrsta kopnenih puževa. Našim terenskim istraživanjima provedenim od 1998. – 2002. godine, kojim su obuhvaćene sve nadmorske kopnene jedinice Parka, broj vrsta kopnenih puževa smo znatno povećali: u čitavom Nacionalnom parku nađeno je 39 vrsta, na otoku Kornatu 31 vrsta, na ostalim nadmorskim kopnenim jedinicama 34 vrste. Našim istraživanjima nismo potvrdili postojanje vrste *Lindholmiola corcyrensis*. To je vrsta južnijeg rasprostranjenja, s centrom areala na južnom Balkanu, vjerojatno u Grčkoj. Smatramo da je nalaz na Kornatu posljedica naplavljivanja morem, i da ona tamo ne živi. Smatramo da bi i drugi navodi u literaturi za Hrvatsku mogli biti posljedica nalaza u naplavinama i da vrsta ne obitava u Hrvatskoj, ali za konačan zaključak treba još dodatnih istraživanja. *Cornu aspersum aspersum* i *Charpentieria gibbula gibbula* nisu na Kornatima autohtone, već su tamo dospjele antropohorijom, jer su uvijek nađene u blizini ili u samim ljudskim naseljima. U fauni se zanimljivošću ističu *Delima vidovichii robusta*, kojoj je na Kornatima najsjevernija točka areala udaljena 50 km od dosadašnje sjeverne granice rasprostranjenja, *Agathylla lamellosa* koja je donedavno bila poznata u Hrvatskoj samo iz južne Dalmacije, a nalaz na Kornatima je drugi nalaz u sjevernom dijelu areala, udaljen oko 150 km od južnog dijela areala i oko 18 km od dosadašnjeg nalazišta u sjevernom dijelu areala, *Delima albocincta albocincta*, endemična podvrsta Kornata, Dugog otoka i Pašmana. *Lauria sempronii*, u čiju točnost determinacije nismo uvjereni, dosada je nađena na samo 4 lokaliteta u Hrvatskoj, tri u Istri i jedan u južnoj Dalmaciji, pa bi ovaj kornatski bio poveznica tih dvaju područja. Otok Kornat ima manje vrsta kopnenih puževa u usporedbi sa susjednim sjevernije položenim Dugim otokom, što bi moglo biti pos-

ljedica manje površine otoka Kornata, ali prvenstveno njegove manje raznolikosti staništa. Sadašnji sastav, raspored i dominacija staništa na Kornatima velikim dijelom je rezultat višestoljetnog utjecaja čovjeka koji je, prvenstveno zbog ovčarstva, krčio šume i pretvarao ih u kamenjarske pašnjake. Današnje aktivnosti ljudi gdje su urbanizacija i turizam ograničeni zakonima o zaštiti prirode, a poljodjelstvo, zastupano prvenstveno ovčarstvom, ne pokazuje tendencije širenja, već naprotiv opadanja, ne ugrožavaju kopnenu malakofaunu. U budućnosti bi trebalo voditi računa da se nalazišta i staništa rijetkih vrsta ne unište.