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TWO NEW EARLY FAMENNIAN RHYNCHONELLID SPECIES (BRACHIOPODA) FROM THE VOLHYN-PODILLIAN MONOCLINE (UKRAINE)

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The lower Famennian Brachiopods from the Volhyn-Podillian monocline are abundant, various and well preserved, but these preliminary investigations need to be completed by a detailed and thorough study. The scientific community has still not grasped this potential wealth of information. Two new rhynchonellid species *Colophragma balinskii* sp. nov. and *Ptychomaletoechia pauli* sp. nov. are described in detail and adequately illustrated from the lowermost Famennian of this region. Studing of these rhynchonellids make possible the correlation of our sections with the Debnik anticline (Southern Poland) and with other Famennian regions.The type section is deposited in north-west part of the Volhyn-Podillian monocline, named Kowel (or Locatchi) uplift. The type level is Sadov horison (zadonsk and eletz beds of Russia), Varezhanskaja suite (formation), *Palmatolepis triangularis–Palmatolepis crepida* conodont Zones. The present paper is the first step to forming the Atlas of Devonian (Middle and Upper parts) Brachiopods of the Volhyn-Podillian region.

Keywords: Brachiopoda, Rhynchonellida, *Colophragma*, *Ptychomaletoechia*, Lower Famennian, Volhyn-Podilla, Ukraine.

In spite the lower Famennian Brachiopods from the Volhyn-Podillian monocline (Fig. 1) are abundant and generaly have excellent preservation, this region is still almost virgin territory far as our knowledge of lower Famennian brachiopods is concerned. The lower Famennian rhynchonellids is even an urgent issue because our only knowledge is based on previously mentioned names in faunal lists.

The limestones, representing this interval, include brachiopode assamblages that consist of: *Cyrtospirifer asiaticus* Brice, *C. brodi* (Wen.), *Dmitria angustirostris* (Gurich), *Donalosia cf. kosharica* (Sok.), *Steinhagella annae* Lazarev *(ex Leptaena membranacea* Phillips), *Leioproductus buttonensis* Roberts, *Ardiviscus herminae* (Frech) etc., and conodonts of the Zones *P. triangularis-crepida* [1].

In the text it was used such abbreviations: Lpv – length of pedicle valve (at the lateral commissures); Lbv – length of brachial valve; W – width of shell; T – thickness of shell; Aa° – apical angle; Nr\su – number of costae on sulcus; Nr\fo – number of costse on fold; Nr\fl – number of costae on flancs; H su – length of sulcus; VPM – Volhyn-Podillian monocline.

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Fig. 1. Boreholes, from which these two new species of the Volhyn-Podillian monocline (Ukraine) have been retrieved and described in the present paper:

1 – state borders; *2* – Volhyn-Podillian monocline borders

Genus ***Colophragma*** Cooper et Dutro, 1982

***Colophragma balinskii* sp. nov.**

Plate 1, fig. 3–5; fig. 2

1995 *Colophragma?* sp. – A. Balinski, p. 45, pl. 4, fig. 4–5.
1922 ? *Pugnax acuminata* (Martin) var. – Reed, pl. XV, fig. 8–8a.

Holotype. N 863: 501-2, complete shell, Inst.Geol. Sc. NASc. of the Ukraine, Kyiv.

Type horizon. The conodont *P. triangularis-crepida* Zone, Sadov horison, Lower Famennian.

Type locality. Kowel district, Volhyn region, the borehole 5447, depth 334 m.

Derivatio nominis: in honour of Prof. Andrzej Balinski, famous paleontologist from Inst. Paleobiologii PAN, Warszaw, Poland.

Material. Four complete shells have been retrieved from the borehole Kowel 5447, depth 334 m; three complete and three sligtly damaged valves, ibidem, depth 370 m.

Description. Medium-sized for genus rhynchonellid, subrhomboidal in outlines, wider than long, sides narrowly rounded; anterior margin gently and broadly rounded; posterolateral margins forming angle of 105–115°. Anterior comissure strongly denticulated and uniplicated. Beak small, suberect. Surface semicostate; the posterior half smooth, the anterior half clearly costate. One-two costae in sulcus, two-three on fold, and two indistinct ones on flancs.

Pedicle valve in lateral profile gently convex near midvalve. Anterior profile broadly concave and having strongly projecting anterolateral extremitises. Sulcus beginning abruptly at midvalve, deep, and forming about 50–70 per cent of the midwidth. Flancs narrow, flat and steep. Beak small, suberect.

Brachial valve gently convex in lateral profile, most convex in the middle region. Anterior broad and high dome having steep sides. The initiation of the two-three indistinct costae at about midvalve. Fold strongly elevated only in anterior part, with inflated flancs.

The interior of the ventral valve: only long dental plates; dorsal valve interior having a indistinct median septum (?). Other details lacking (table 1, fig. 2).

The costal formula varies in the sulcus and fold from 1–2 to 2–3.

Dimentions, mm. Measurements of 5 specimens. Ex. N 501-4 is from borehole 5 447, depth 370 m, other – from depth 334 m.

N ex.	Lpv	Lbv	W	T	Aa°	Nr\su	Nr\fo	Nr\fr	
501-1	18	16	20	15	(110)	2	3	2	
501-2	13	12	16	12	112	1	2	2	Holotype
501-3	16	14	16	12	110	1	2	2	
501-5	16	15	18	10	115	1	2	1	
501-4	15	14	18	13	120	1	2	2	

Comparisons. *Colophragma balinskii* sp. nov. is distinct by outline and costation, aspect of the sulcus and fold identic to the *Colophragma* (?) sp. from ***crepida*** Zone of Poland

[11, pl. 4:4–5; text-fig. 11 B]. The lowermost Famennian *C. ellipticum* Cooper et Dutro from Cantadero farmation of New Mexico [14, pl. 16, fig. 49–58; pl. 17, fig.1–3; pl. 18, fig. 3–7; pl. 40, fig. 11–19] has external and internal characters in common with *C. balinskii* sp. nov., but is distinct from transversaly elliptical outline and more obtuse dorsal beak.

Remarks. Famennian pugnacidae *Physetorhyncha pestchanensis* Tcherkesova from russian Taymir [10, p. 59, fig. 1] is also similar, but can be easily separated by more sharpness costation. *Parapugnax bactrianense* Johnson et al. from uppermost part of Devonian of Nevada, USA [17, p. 1360, pl. 157, fig. 1–18] also has external characters in common with *C. balinskii* sp.nov.,but is distinct from more convexity and sharpness costation. Late Frasnian *Coeleterorhynchus dillanus* (Schmidt) from Wietrznia, South Polish carbonate shelf [13, p. 647, fig. 14, F] is distinct from well marked sulcus and fold and bigger size.

Lower Famennian *Paramoeopygma sergei* Pushkin from Pripyat` depression, Belarus` [9, p. 76, table 1, fig. 7] are similar with *C. balinskii* sp. nov., but distinct from twofold more dimentions and different internal characters.

The more variable specimens, named *Pugnax acuminata* Martin commonly reach in Upper Devonian from Europe and Asia [6, p. 83, table VI, fig. 11–12, etc.], has only external characters in common with *C. balinskii* sp. nov., but their internal characters are unknown.

Discussion. The founders of the genus G. A. Cooper and J. T. Dutro compared *Colophragma* n. gen. with common *Pugnacidae* in varius publications*: Atabashia* Cricmay (1963), *Coeleterorhynchus* Sartenaer (1966*), Ningbingella* Roberts (1971*), Schumardella* Weller (1910) and *Parapugnax* Schmidt (1964), separable from their by occasional absence or presence of the median septum is an only that the character of the intraspecific variability.

Occurrence. NW of the Volhyn-Podillian monocline, Ukraine, Lower Famennian, Sadov horison, the *triangularis-crepida* Zone; Debnik anticline, trenches Z2, Z9, Poland, the *crepida* Zone, int. *Iloerinchus mesoplicatus*.

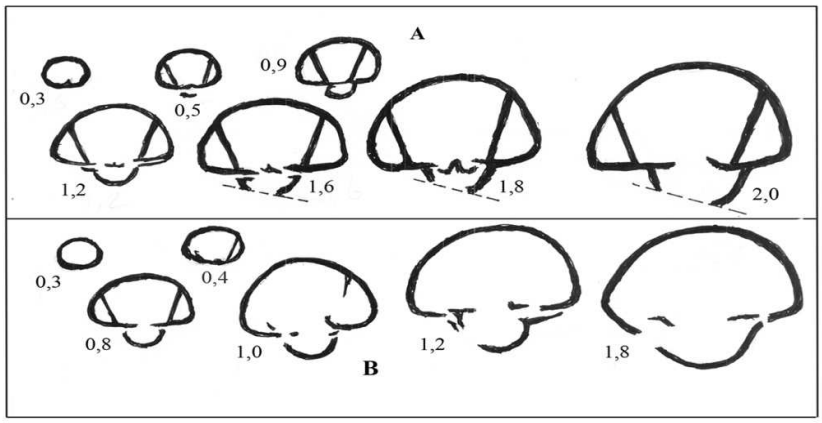

Fig. 2. Transverse serial sections of *Colophragma balinskii* sp. nov. (figures are distances in mm of the section forward of the crest of the ventral umbo).

A, B – hypotypes: A – bor. Kowel 5447, depth. 370 m, N 503-1; B – bor. Kowel 5447, depth. 370 m, N 504-4.

Genus ***Ptychomaletoechia*** Sartenair, 1961

Ptychomaletoechia pauli sp. nov.

Plate 1, fig. 1–2; fig. 3

1995 *Ptychomalethoechia* sp. – Balinski, p. 41, pl. 4: 1–3, text-fig. 8.
2002 *Ptychomalethoechia* sp. – Balinski, text-fig.

Holotype: N 863:502-10, complete shell, Inst. Geol. sc. of the NASc. of the Ukraine, Kyiv.

Type horizon. The conodont *triangularis-crepida* Zone, Sadov horison, lower Famennian.

Type locality. Kowel district, Volhyn region, the borehole 5447, depth 305 m.

Derivatio nominis: in honour of Prof. Paul Sartenair, famous paleontologist from Inst. Royal Sc. Nat. Belgique, Bruxelles. The name was proposed by Dr V. I. Pushkin from Belarus.

Material. 30 complete specimens have been retrived from the boreholes (number of specimens in parentheuses): Kowel 5447, depth 305–320 m (16), depth 320–325 m (13), Lokachi–6, depth 718–722 m (1).

Description. Small to medium-sized, dorsibiconvex, subtriangular in outline. General aspect variable on account of proportion of convexity of both valves as well as general thickness of shell which varies from moderate 7-8 mm to noticeable 15–19 mm. In the most cases the shell is «glandeforme» or like an acorn (Pl. 1, fig.1–2), with slightly protruding umbonal region. Lateral margins arched, anterior margin truncated by the flat tongue. Anterior commissure uniplicate, lateral commissure with the distinct constriction.

Pedicle valve slightly convex, attainning 15–20 per cent of the shell tickness. Anterior margin uniplicate. Cardinal margin curved. The bottom of the sulcus flat to slightly concave, geniculate, each slope bears one parietal costae. Tongue trapezoidal, sometimes slightly recurved posteriorly.

Brachial valve thrice as deep as ventrale valve with vertical slopes. Fold appearing at about valve midlength, with arched top.

There are 6–7 costae on the sulcus, 8–12 costae on fold, and up to 14–18 costae on each flank of a valve. One parietal costae usually occurs on each slope of fold and sulcus, they do not indent the commissure.

Dental plates are presented inside the pedicle valve, interior of the brachial valve as for the genus (Fig. 3).

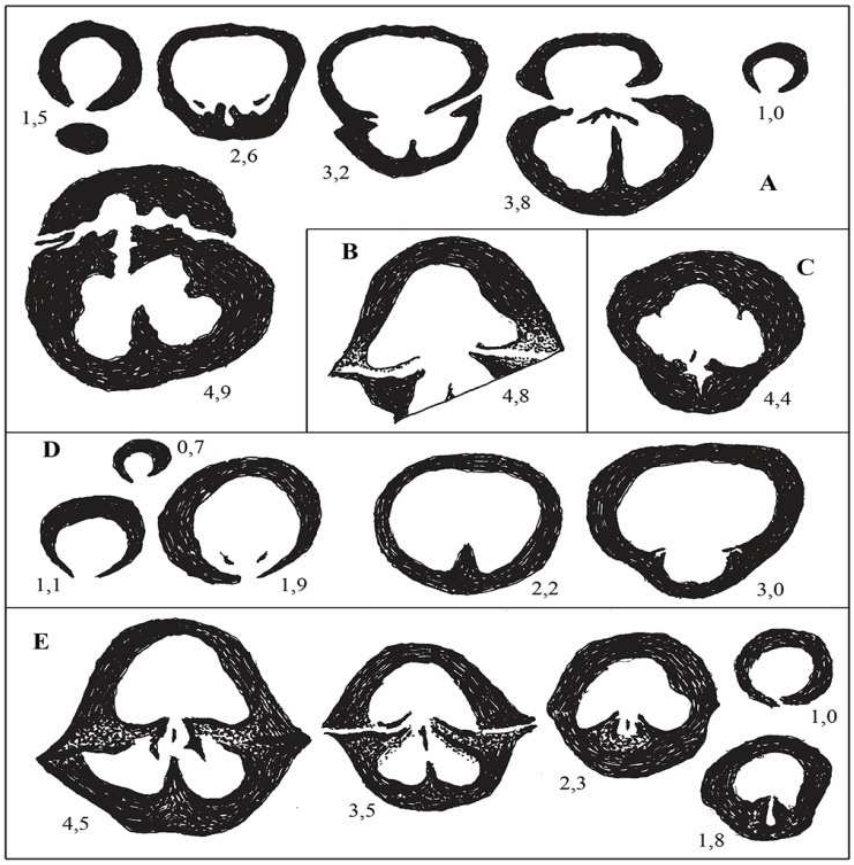

Fig. 3. *Ptychomaletoechia pauli* sp. nov. Transvers serial sections figures are distances in mm of the section forward of the crest of the ventral umbo. A, B, C, D, E – hypotypes: from borechole 5447, depth 305–325 m:

A – depth. 320–325 m; N 500-11; B – depth. 305–320 m; N 502-2; C – depth. 305–320 m; N 502-8; D – depth. 305–320 m; N 502-12; E – depth. 305–320 m; N 502-5

Dimansions, mm. Measurements of 5 specimens.

N ex.	Lpv	Lbv	W	T	Aa°	Nr\su	Nr\fo	Nr\fl	H\su
502-11	1	4	14	14	115	6	8	12	13
502-9	4,5	13	17	16	114	8	10	14	14
502-10,	4	14	17	16	112	8	10	18	16 Holotype
502-20	5	18	17	-.-	-.-	10	-.-	-.-	(incomplete)
505-1	3	13	16	18	118	8	12	12	13

Ex. N 502-9, 10, 11, 20 – from borehole 5447, depth 305 m, 505-1 from borehole Lokatchi–1, depth 718–722 m.

Comparisons. The Lower Famennian (*crepida* Zone) *Ptychomaletoechia* sp. from Poland [11, 12] has external and internal characters very close, if not identical to flattened specimens of the *P. pauli* sp. nov.: similar size, contours, costation, well marked sulcus and fold.

The Ukrainian specimens are similar externally to Famennian *Ptychomaletoechia brodica* (Nalivkin) of Russia, Dniepr-Donetz and Pripyat` Depressions, Volhyn-Podillian monocline [2–4, 7–9], but *P. pauli* sp. nov. differ by distinctly more convex «glandeforme» shell, vertical slopes of the brachial valve, by the more dimansion of sulcus and fold, and the clear constriction in the lateral commissure.

Remarks. The lower Famennian (Petrikov beds) *Ripidiorhynchus galinae* Pushkin from Pripyat` Depression, Belarus [9, P. 200, pl. 1, fig.1) have externally identical to *Ptychomaletoechia* sp. from Poland, are also very close to *P. pauli* sp. nov.

Ukrainian specimens are externally close also to some specimens of «*Hypothyridina cuboides*» Sowerby group from Middle-Upper Devonian and Lower Carboniferous (?) of the Russia and Kazakhstan [7, p. 96, table XX1, fig. 15] and Turkestan [6].

Occurrence. NW of the Volhyn-Podillian monocline, Ukraine, Sadov horizon, the *triangularis-crepida* conodont Zone. The same stratigraphical level is in Poland.

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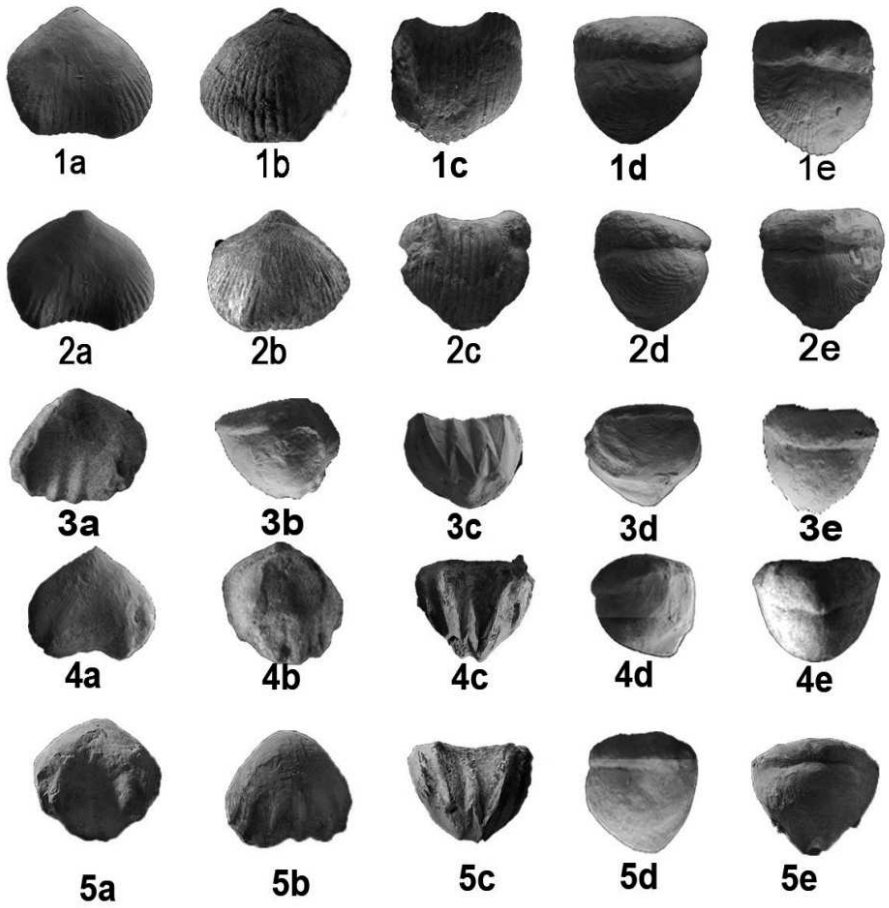
REFERENCES

1. *Dryhant D. M.* Devonski konodonty pivdenno-zakhidnoi okrainy Skhidnoievropeiskoi platformy (Volyno-Podillia, Ukraina) / *Dryhant D. M.* – Kyiv : Akademperiodyka, 2010. – P. 1–156; 23 paleont. tabl.
2. *Kotliar O. Iu*. Stratyhrafichna skhema devonskykh vidkladiv Volyno-Podillia. Krok do modernizatsii // Tektonika i stratyhrafiia / *Kotliar O. Iu*. – Kyiv. – N 38. – 2011. – P. 50–66.
3. *Kotliar O. E*. Atlas pozdnedevonskykh brakhyopod Dneprovsko-Donetskoy vpadiny. Kiev : Printquick, 2017. – P. 1–86.
4. *Liashenko A. Y.* Atlas brakhyopod y stratyhrafyia devonskykh otlozhenyi tsentralnoi chasty Russkoy platform / *Liashenko A. Y.* – Moskva : Hostoptepkhyzdat, 1959. – P. 1–451.
5. *Myzens A. H*. Brachiopods and Biostratigraphy of the Upper Devonian of the Middle and Southern Urals / *Myzens A. H*. – Inst. Geol. and Geoch. named after Acad. A. N. Zavaritski. – Ekaterinburg, 2012. – P. 1–324.
6. *Nalyvkyn D. V*. Brachiopods from the Upper and Middle Devonian of the Turkestan / *Nalyvkyn D. V*. // Tr. Geol. Kom., N. S. – Moskva, 1930. – N 180. – P. 1–221.
7. *Nalyvkyn D. V*. Atlas rukovodiashchykh form iskopaemykh faun SSSR / *Nalyvkyn D. V*. Ch. 3, Devonskaia systema. Hosheolyzdat, Lenyngrad. 1947. – P. 1–243.
8. *Pomianovska H. M*. Rozpovsiudzhennia ta rozvytok brakhiopod u devoni Lvivskoi zapadyny. V kn.: Stratyhrafiia URSR, T.4, P. 2. Devon. Kyiv : Naukova Dumka, 1974. – P. 83–99.
9. *Pushkyn V. Y*. Famenskye rynkhonellidy (Brakhyopoda) Belorussyy. P. 1. Semeistva Trigonirhynchiidae, Pugnacidae, Hadrorhynchiidae. Novye y maloyzvestnыe vydy yskopaemыkh zhyvotnykh y rastenyi Belorussyy. Belorusskoe otdelenye Vsesoiuznoho Paleontolohycheskoho obshchestva Belo-

russyy / *Pushkyn V. Y.* Belorusskyi nauchno-yssledovatelskyi heolohorazvedochnyi ynstytut. Ynstytut heokhymyy y heofyzyky. Akademyia Nauk BSSR. Nauka y Tekhnyka. – Mynsk : 1986. – P. 63–96.

10. *Cherkesova S. V.* Novye vydy famenskykh Pugnacidae (brakhyopodы) Tsentralnoho Taimyra / *Cherkesova S. V.* // Paleont. Zhurn. – Moskva, 1997. – N 5. – P. 59–62.
11. *Balinski A.* Brachiopods and conodonts biostratigraphy of the Famennian from the Debnik anticline, southern Poland / *Balinski A.* // Paleontologica Polonica. – 1995. – N 54. – P. 1–88.
12. *Balinski A.* Frasnian-Famennian brachiopod extinction and recovery in southern Poland / *Balinski A.* // Acta Paleont. Pol. – 2002. – N 47. – P. 289–305.
13. *Balinski A.* Brachiopods and their response to the Early-Middle Frasnian biogeochemical perturbations on the South Polish carbonate shelf / *Balinski A.* // Acta Paleont. Pol. – 2006. – N 51(4). – P. 646–678.
14. *Cooper G. A.* Devonian brachiopods of New Mexico / *Cooper G. A., Dutro J. T.* // Bulletins of American Paleontology. – 1982. – (82 and 83). N 315. – P. 1–215.
15. *Havlicek V.* Upper Devonian and lower Tournaisian Rhynchonellida in Czechoslovakia / *Havlicek V.* // Vestnik Ustredniho Ustavu Geologickeho. – 1979. – N 54(2). – P. 87–101.
16. *Halamski A.* Latest Famennian brachiopods from Kowala, Holy Cross Mountains, Poland / *Halamski A., Balinski A.* // Acta Paleont. Pol. – 2009. – N 54. – P. 289–306.
17. *Johnson J. G.* Late Upper Devonian from the West Range Limestone of Nevada / *Johnson J. G., Reso A., Stephens A.* // J. P. – 1969. – V. 43. – N 6. – P. 1351–1368.
18. *Matyja H.* Stratigrafia dewonu gorrnego profilu wiercenia Minkowice 1 (basen lubelski) / *Matyja H., Zbikowska B.* // Acta Geol. Pol. – 1974. – Vol. 24. – N 4. – P. 663–688.
19. *Montequin B.* Famennian rhynchonellides (Brachiopoda) from deep-water facies of the Ougarta Basin (Saoura Valley, Algeria) / *Montequin B., Zohra Malti F., Benyoucef M.* – 2015. – Vol. 152. – Issue N 6. – P. 1009–1024.
20. *Reed F. R. C.* Devonian fossils from Chitral and the Pamirs / *Reed F. R. C.* – Paleontol. Ind. – 1922. – Vol. 6. – N 2. – P. 1–134.
21. *Sartenaer P.* Late Upper Devonian (Famennian) rhynchonellid brachiopods from western Canada / *Sartenaer P.* // Geological Survey of Canada. – 1969. – Bulletin N 169. – P. 1–269.

Plate 1



Explication of Plate. All figures are in natural size.

Fig. *1–2*. *Ptychomaletoechia pauli* sp. nov.: *1* – Holotype, IGN NASc. of the Ukraine, N 863:502-10, VPM, borehole Kowel 5 447, depth 305 m, ventral, dorsal, frontal, apical and lateral views, lower Famennian; *2* – Hypotype, N 863:502-9, same borehole, depth 325 m, same views, lower Famennian.

Fig. *3–5*. *Colophragma balinskii* sp. nov.: *3* – Hypotype, IGN NASc. of the Ukraine, N 863:501-2, VPM, borehole Kowel 5447, depth 334 m, ventral, dorsal, frontal, apical and lateral views, lower Famennian; *4* – Hypotype, N 863:501-1, same borehole, same depth, same views; *5* – Holotype, N 863:501-10, same borehole, same depth, same views.

ДВА НОВИХ ВИДИ РАННЬОФАМЕНСЬКИХ РИНХОНЕЛЛІД (БРАХІОПОДИ) З ВОЛИНО-ПОДІЛЬСЬКОЇ МОНОКЛІНАЛІ (УКРАЇНА).

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Брахіоподи нижнього фамену Волино-Подільської моноклінали численні, різноманітні, чудової збереженості, але попередні їх дослідження недосконалі через відсутність детального комплексного вивчення. Наукова спільнота потребує більш повної інформації у цій галузі. З цією метою монографічно вивчені, детально описані та зображені два нові види ринхонеллід: *Colophragma balinskii* та *Ptychomaletoechia pauli* sp. nov., які знайдені у самих низах фаменських відкладів цього регіону. Вивчення цих скам'янілостей дозволяє корелювати вміщуючі відклади із фаменом антикліналі Дебнік (південна Польща), а також з іншими регіонами. Типові розрізи розташовані у північно-західній частині Волино-Подільської моноклінали, яка має назву Ковельського (або Локачинського) підняття. Типовими відкладами є Садовський горизонт (задонські та єлецькі верстви Росії), варежанська світа, конодонтові зони *Palmatolepis triangularis – Palmatolepis crepida.* Ці досдлідження вважаються першим кроком до публікації Атласу девонських (середній та верхній відділи) брахіопод Волино-Поділля.

Ключові слова: Брахіоподи, Ринхонелліди, *Colophragma*, *Ptychomaletoechia*, нижній фамен, Волино-Поділля, Україна.

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