

The Dzerzhinka Section (eastern slope of the South Urals): An overview of the fauna and facies around the Devonian-Carboniferous boundary

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Abstract

The Devonian-Carboniferous boundary section near the village of Dzerzhinka (vicinity of Verkhneuralsk) on the Ural River on the eastern slope of the South Urals, Russia, contains a wide variety of fossil invertebrates, including foraminifers, ostracodes, ammonoids, conodonts, and brachiopods. Diverse Upper Famennian assemblages are associated with wackestone-grainstone microfacies and bioclastic-volcaniclastic arenite, suggesting normal marine sedimentation in a volcanic-arc setting. The presence of well-established shallow-water benthic communities associated with the basal *Palmatolepis* conodont biofacies and breccias is difficult to interpret. The latest Devonian and earliest Mississippian *Siphonodella praesulcata* and *S. sulcata* conodont zones are missing from the succession, indicating a discontinuity of sedimentation that is, associated with a hardground with phosphorite nodules. By the time of the *S. quadruplicata* Zone, normal marine sedimentation resumed, while the shelf continued to subside and was eventually overlain by siliciclastic and cherty sediments.

<http://dx.doi.org/10.29041/strat.14.1-4.143-178>

References

- [1] ABRAMYAN, M. S., 1957. Brachiopods of the Upper Famennian and Etroeungt deposits of southwestern Armenia. Yerevan: Izdatelstvo Akademii Nauk Armyanskoi SSR, 143 pp. [in Russian]
- [2] ALBERTI, H., GROOS-UFFENORDE, H., STREEL, M., UFFENORDE, H. and WALLISER, O. H., 1974. The stratigraphical significance of the *Protognathodus* fauna from Stockum (Devonian-Carboniferous boundary, Rhenish Schiefergebirge). *Newsletters on Stratigraphy*, 3: 263-276.
- [3] ARISTOV, V. A., GAGIEV, M. H. and KONONOVA, L. I., 1983. Phylomorphogenesis and stratigraphic significance of the genus *Mashkovia* gen. Nov. (Conodontophorida). *Izvestia Akademii Nauk SSSR, Seriya Geologicheskaya*, 2: 72-83. [in Russian]
- [4] ARTYUSHKOVA, O. V., MASLOV, V. A., PAZUKHIN, V. N., KULAGINA, E. I., TAGARIEVA, R. CH., MIZENS, L. I. and MIZENS, A.G., 2011. Devonian and Lower Carboniferous type sections of the western South Urals. In: Puchkov, V. N., Ed., Pre-Conference Field Excursion Guidebook. International Conference "Biostratigraphy, Paleogeography and Events in Devonian and Lower Carboniferous", Ufa, Sterlitamak, Russia, July 20-25, 2011. Ufa: Institute of Geology, Ufa Scientific Center, Russian Academy of Sciences, 92 pp.
- [5] BARANOV, V. V. and SARTENAER, P., 1996. *Momarhynchus*, new Lower Famennian rhynchonellid brachiopod genus from Yakutia. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre*, 66: 37-42.

- [6] BARSKOV, I. S., SIMAKOV, K. V., ALEKSEEV, A. S., BOGOSLOVSKY, B. I., BYVSHEVA, T. V., GAGIEV, M. H., KONONOVA, L. I., KOCHETKOVA, N. M., KUSINA, L. F. and REITLINGER, E. A., 1984. Devonian-Carboniferous transitional deposits of the Berchogur section, Mugodzhary, USSR. *Courier Forschungsinstitut Senckenberg*, 67: 207-230.
- [7] BECKER, R. T., 1993. Anoxia, eustatic changes, and Upper Devonian to lowermost Carboniferous global ammonoid diversity. In: House, M. R., Ed., *The Ammonoidea: Environment, ecology, and evolutionary change*, 115-163. Oxford: Clarendon Press, Systematic Association, Special Publication 47.
- [8] BECKER, R. T. and HOUSE, M. R., 2000. Devonian ammonoid zones and their correlation with established series and stage boundaries. *Courier Forschungsinstitut Senckenberg*, 220: 113-151.
- [9] BECKER, R. T., GRADSTEIN, F. M. and HAMMER, O., 2012. The Devonian Period. In: Gradstein, F. M., Ogg, J.G., Schmitz, M. D. and Ogg, G. M., Eds., *The Geologic Time Scale 2012*, 559-601. Amsterdam: Elsevier.
- [10] BECKER, R. T., KAISER, S. I. and ARETZ, M., 2016. Review of chrono-, litho- and biostratigraphy across the global Hangenberg Crisis and Devonian-Carboniferous Boundary. In: Becker, R. T., Königshof, P. and Brett, C. E., Eds., *Devonian climate, sea level and evolutionary events*, 355-386. London: Geological Society of London, Special Publication 423.
- [11] BECKER, R. T., KÖNIGSHOF, P. and BRETT, C. E., 2016. Devonian climate, sea level and evolutionary events: An introduction. In: Becker, R. T., Königshof, P. and Brett, C. E., Eds., *Devonian climate, sea level and evolutionary events*, 1-10. London: Geological Society of London, Special Publication 423.
- [12] BECKER, R. T., HOUSE, M. R., BOCKWINKEL, J., EBBIGHAUSEN, V. and ABOUSSALAM, Z. S., 2002. Famennian ammonoid zones of the eastern Anti-Atlas (southern Morocco). *Münster Forschungen zur Geologie und Paläontologie*, 93: 159-205.
- [13] BELKA, Z., 1998. Taxonomy, phylogeny and biogeography of the late Famennian conodont genus *Mashkovia*. *Journal of Micropalaeontology*, 17: 119-124.
- [14] BIERNAT, G. and SZULCZEWSKI, M., 1993. The Famennian brachiopod *Zilimia polonica* (Gürich) and its palaeoenvironmental significance. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 100: 37-46.
- [15] BISCHOFF, G., 1957. Die Conodonten-Stratigraphie des rhino-herzynischen Unterkarbons mit Berücksichtigung der Wocklumeria-Stufe und der Devon/Karbon Grenze. *Abhandlungen des Hessischen Landesamtes für Bodenforschung*, 19: 1-64.
- [16] BISCHOFF, G. and ZIEGLER, W., 1956. Das Alter der "Urfer Schichten" im Marburger Hinterland nach Conodonten. *Notizblatt des Hessisches Landesamt für Bodenforschung*, 84: 138-169.
- [17] BOGOSLOVSKY, B. I., 1971. Goniatitida. Devonian ammonoidea, II. Moscow: Nauka, Paleontologicheskii Institut, Akademiya Nauk SSSR, Trudy 127, 228 pp. [in Russian]
- [18] 1981. Clymeniids (Suborder Gonioclymeniina). Devonian ammonoidea, III. Moscow: Nauka, Paleontologicheskii Institut, Akademiya Nauk SSSR, Trudy 191, 124 pp. [in Russian]
- [19] BOGUSH, O. I. and JUFEREV, O.V., 1960. New species of Tournaisian foraminifers of Karatau and western fringes of the Talass Alatau. *Paleontologicheskii Zhurnal*, 4: 16-27. [in Russian]
- [20] BOUCOT, A., 1975. Evolution and Extinction Rate Controls. *Developments in Palaeontology and Stratigraphy*. Volume 1. Amsterdam: Elsevier, 427 pp.
- [21] BRANSON, E. B. and MEHL, M. G., 1934. Conodonts from the Bushberg Sandstone and equivalent formations of Missouri. *The University of Missouri Studies*, 8 (4): 265-299.
- [22] BRANSON, E. R., 1934. Conodonts from the Hannibal Formation of Missouri. *The University of Missouri Studies*, 8 (4): 301-343.
- [23] BROWN, D. and SPADEA, P., 1999. Processes of forearc and accretionary complex formation during arc-continent collision in the southern Ural Mountains. *Geology*, 27: 649-652.
- [24] BROWN, D., SPADEA, P., PUCHKOV, V., ALVAREZ-MARRON, J., HERRINGTON, R., WILLNER, A. P., HETZEL, R., GOROZHANINA, Y. and JUHLIN, C., 2006. Arc-continent collision in the southern Urals. *Earth-Science Reviews*, 79: 261-287.
- [25] CHERNYSHEV, F. N., 1887. Fauna of the Middle and Upper Devonian of the western slope of the Urals. St. Petersburg: Tipografiya M. M. Stasulevicha, Geologicheskii Komitet, Trudy 3, Vypusk 3, 114 pp. [in Russian]
- [26] CHUVASHOV, B. I., NASEDKINA, V. A. and PLYUSNINA, A. A., 1975. Correlation of the foraminiferal and conodont zones in the Devonian-Carboniferous boundary beds on the eastern slope of the South Urals. In: Smirnov, G. A. and Papulov, G. N., Eds, *Kamennougolnye otlozheniya Urala*, 14-19. Sverdlovsk: Uralskiy Nauchny Tsentri Akademii Nauk SSSR. [in Russian]
- [27] CONIL, R., GROESSENS, E., LALOUEX, M., POTY, E. and TOURNEUR, F., 1991. Carboniferous guide foraminifera, corals and conodonts in the Franco-Belgian and Campine basins. Their potential for widespread correlation. *Courier Forschungsinstitut Senckenberg*, 130: 15-30. [imprinted 1990]
- [28] CORRADINI, C., 2003. Late Devonian (Famennian) conodonts from the Corona Mizzi sections near Villasalto (Sardinia, Italy). *Palaeontographia Italica*, 98: 65-116.

- [29] CORRADINI, C., KAISER, S. I., PERRI, M. C. and SPALLETTA, C., 2011. Conodont genus *Protognathodus* and its potential as a tool for defining the Devonian-Carboniferous boundary. *Rivista Italiana di Paleontologia e Stratigrafia*, 117: 15-28.
- [30] CORRADINI, C., SPALLETTA, C., MOSSONI, A., MATYJA, H. and OVER, D. J., 2016. Conodonts across the Devonian-Carboniferous boundary: A review and implication for the redefinition of the boundary and a proposal for an updated conodont zonation. *Geological Magazine*, 151: 1-15.
- [31] DAVYDOV, V. I., KORN, D. and SCHMITZ, M. D., 2012. The Carboniferous Period. In: Gradstein, F. M., Ogg, J. G., Schmitz, M. D. and Ogg, G. M., Eds., *The Geologic Time Scale 2012*, 603-651. Amsterdam: Elsevier.
- [32] DEHÉE, R., 1929. Description de la faune d'Étroeuungt. Faune de passage du Dévonien au Carbonifère. Paris: Mémoires de la Société géologique de France, Nouvelle Série, Mémoire 5, 64 pp.
- [33] DENCKMANN, A., 1901. Ueber das Oberdevon auf Blatt Balve (Sauerland). *Jahrbuch der Königlich Preussischen Geologischen Landesanstalt und Bergakademie zu Berlin*, 21: I-XIX.
- [34] DENCKMANN, A. and LOTZ, H., 1900. Ueber einige Fortschritte in der Stratigraphie des Sauerlandes. *Zeitschrift der Deutschen Geologischen Gesellschaft*, 52: 564-567.
- [35] DOROBK, S. L., 2008. Carbonate-platform facies in volcanic-arc settings: Characteristics and controls on deposition and stratigraphic development. In: Draut, A. E., Clift, P. D. and Scholl, D. E., Eds., *Formation and applications of the sedimentary record in arc collision zones*, 55-90. Boulder: Geological Society of America, Special Paper 436.
- [36] DREESSEN, R. and THOREZ, J., 1980. Sedimentary environments, conodont biofacies and paleoecology of the Belgian Famennian (Upper Devonian) - An approach. *Annales de la Société Géologique de Belgique*, 103: 97-110.
- [37] DURKINA, A. V., 1959. Foraminifers from the Lower Carboniferous deposits of the Timan-Pechora Province. In: Shlykova, T. I., Ed., *Mikrofauna SSSR. Sbornik X. Ostrakody i foraminifery Russkoi platformy i Srednei Azii*, 132-389. Leningrad: Gostoptekhizdat, Vsesoyuznyi Neftyanoy Nauchno-Issledovatel'skiy Geologorazvedochnyi Institut, Trudy 136. [in Russian]
- [38] DZIK, J., 1997. Emergence and succession of Carboniferous conodont and ammonoid communities in the Polish part of the Variscan Sea. *Acta Palaeontologica Polonica*, 42: 57-170.
- [39] 2006. The Famennian "Golden Age" of conodonts and ammonoids in the Polish part of the Variscan Sea. *Palaeontologia Polonica*, 63: 1-360.
- [40] FERSHTATER, G. B., KRASNOBAEV, A. A., BORODINA, N. S., BEA, F. and MONTERO, P., 2007. Geodynamic settings and history of the Paleozoic intrusive magmatism of the central and southern Urals: Results of zircon dating. *Geotectonics*, 41: 465-486.
- [41] FLAJS, G., FEIST, R. and ZIEGLER, W., Eds., 1988. Devonian-Carboniferous boundary-results of recent studies. Frankfurt am Main: Courier Forschungsinstitut Senckenberg, 100, 245 pp.
- [42] FLÜGEL, E., 2010. *Microfacies of carbonate rocks*. Berlin: Springer-Verlag, 984 pp.
- [43] FLÜGEL, H. and ZIEGLER, W., 1957. Die Gliederung des Oberdevons und Unterkarbons am Steinberg westlich von Graz mit Conodonten. *Mitteilungen des Naturwissenschaftlichen Vereines für Steinmark*, 87: 25-60.
- [44] FRECH, F., 1891. Über das Devon der Ostalpen. *Zeitschrift der deutsche geologische Gesellschaft*, 43: 672-687.
- [45] GAGIEV, M. H., 1979. Conodonts from the Devonian-Carboniferous boundary of the Omolon massif. In: Simakov, K. V., Ed., 14th Tihookeanskiy Nauchnyi Congress, Khabarovsk 1979. Guidebook of tour IX. Magadan: Dalnevostochnyi Nauchnyi Tsent, Severo-Vostochnyi Kompleksnyi Nauchno-Issledovatel'skiy Institut, *Academiya Nauk SSSR. Supplement 2*, 104 pp. [in Russian]
- [46] GARAN, I. M., GUSEVA, S. N., DEVINGTAL, V. V., DONAKOVA, L. M., ENOKYAN, N.V., KALASHNIKOV, N.V., LAPINA, N. N., MICHAILOVA, E. N., NALIVKIN, D. V., SEMICHATOVA, S. V., STEPANOV, D. L., STEPANOVA, G. A., SHESTAKOVA, M. F. and EINOR, O. L., 1975. Brachiopoda (Brachiopods). In: Stepanov, D. L., Ed., *Paleontologicheskii atlas kamennougol'nykh otlozheniy Urala*, 154-203. Leningrad: Nedra. Vsesoyuznyi Neftyanoy Nauchno-Issledovatel'skiy Geologorazvedochnyi Institut, Trudy 383. [in Russian]
- [47] GATOVSKY, Y. A., 2009. New genera *Barskovella* and *Bizignathus* (conodonts) from the Famennian of southern Kazakhstan. *Paleontological Journal*, 43: 550-557.
- [48] 2015. Famennian-Tournaisian boundary on the western slope of the South Urals, Russia: new look. In: Mottequin, B., Denayer, J., Königshof, P., Prestianni, C. and Olive, S., Eds., *Climate change and biodiversity patterns in the Mid-Palaeozoic*, 51-52. Brussels: University of Brussels, *Strata, série 1*, 16.
- [49] GATOVSKY, Y. A., KONONOVA, L. I. and PAZUKHIN, V. N., 2011. On the question of the Devonian-Carboniferous boundary in the CIS. In: Alekseev, A. S., Ed., *Palaeostrat-2011. Program and abstracts*, 24-26. Moscow: Paleontologicheskii Institut. [in Russian]
- [50] GIBSHMAN, N. B. and ALEKSEEV, A. S., 2017. Marine algal flora of late Viséan (Early Carboniferous) of the Moscow Basin. *Paleontologicheskii Zhurnal*, 3: 1-11. [in Russian]
- [51] GIRARD, C., 1994. Conodont biofacies and event stratigraphy across the D-C boundary in the stratotype area (Montagne Noire, France). *Courier Forschungsinstitut Senckenberg*, 168: 299-309.

- [52] GIRARD, C., CORNÉE, J.-J., CORRADINI, C., FRAVALO, A. and FEIST, R., 2014. Palaeoenvironmental changes at Col des Tribes (Montagne Noire, France), a reference section for the Famennian of north Gondwana-related areas. *Geological Magazine*, 151: 864-884.
- [53] GOROZHANINA, E. N., PAZUKHIN, V. N. and PUCHKOV, V. N., 2010. The paleogeodynamic conditions of redeposition of conodont elements in the Late Devonian-Early Carboniferous sediments of the southern Urals. *Doklady Earth Sciences*, 432: 560-564.
- [54] GÜRICH, G., 1896. Das Paläozoicum im polnischen Mittelgebirge. *Verhandlungen der Russisch-kaiserlichen mineralogischen Gesellschaft zu St. Petersburg, Serie 2*, 32: 1-539.
- [55] HALAMSKI, A. T. and BALINSKI, A., 2009. Latest Famennian brachiopods from Kowala, Holy Cross Mountains, Poland. *Acta Palaeontologica Polonica*, 54: 289-306.
- [56] HALL, J. and CLARKE, J. M., 1893. An introduction to the study of the genera of Palaeozoic Brachiopoda. New York Geological Survey, *Paleontology*, 8: 1-317.
- [57] HARTENFELS, S., 2011. Die globalen Annulata-Events und die Dasberg-Krise (Famennium, Oberdevon) in Europa und Nord-Afrika-hochauflösende Conodonten-Stratigraphie, Karbonat-Mikrofazies, Paläoökologie und Paläodiversität. *Münstersche Forschungen zur Geologie und Paläontologie*, 105: 17-527.
- [58] HASS, W. H., 1959. Conodonts from the Chappel Limestone of Texas. Washington: U. S. Geological Survey Professional Paper, 294-J: 385-399.
- [59] HECKEL, P. H., BRECKLE, P. L., LANE, H. R., RANKEY, E. C., WITZKE, B. J., BUNKER, B. J., MASTERS, J. M. and LASEMI, Z., 2005. Stratigraphy and biostratigraphy of the Mississippian Subsystem (Carboniferous System) in its type region, the Mississippi River Valley of Illinois, Missouri, and Iowa. Champaign-Urbana: Illinois Department of Natural Resources, Illinois State Geological Survey Guidebook 34, 105 pp.
- [60] HELMS, J., 1959. Conodonten aus dem Saalfelder Oberdevon (Thüringen). *Geologie*, 8: 634-677.
- [61] 1963. Zur "Phylogenese" und Taxonomie von *Palmatolepis* (Conodontida, Oberdevon). *Geologie*, 12: 449-485.
- [62] HUDDLE, J.W., 1934. Conodonts from the New Albany Shale of Indiana. *Bulletins of American Paleontology*, 21: 186-325.
- [63] IVANOVA, R. M., 2013. Carboniferous calcareous algae of the Urals. Yekaterinburg: Institute of Geology and Geochemistry, Ural Branch of the Russian Academy of Sciences, 244 pp. [in Russian]
- [64] KAISER, S. I., 2005. "Mass extinctions, climatic and oceanographic changes at the Devonian-Carboniferous boundary". Unpublished Ph.D. dissertation, Fakultät für Geowissenschaften, Ruhr-Universität, Bochum, <http://www-brs.ub.ruhr-uni-bochum.de/netahtml/HSS/Diss/KaiserSandraSabella/diss.pdf>
- [65] 2009. The Devonian-Carboniferous stratotype section La Serre (Montagne Noire) revisited. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 43/2: 195-205.
- [66] KAISER, S. I. and CORRADINI, C., 2008. Should the Devonian/Carboniferous boundary be redefined?. *Subcommission on Devonian Stratigraphy Newsletter*, 23: 55-56.
- [67] 2011. The early siphonodellids (Conodonta, Late Devonian- Early Carboniferous): Overview and taxonomic state. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 261: 19-35.
- [68] KAISER, S. I., BECKER, R. T., SPALLETTA, C. and STEUBER, T., 2009. High-resolution conodont stratigraphy, biofacies and extinction around the Hangenberg Event in pelagic successions from Austria, Italy and France. *Palaeontographica Americana*, 63: 97-139.
- [69] KAISER, S. I., BECKER, R. T., STEUBER, T. and ABOUSSALAM, S. Z., 2011. Climate-controlled mass extinctions, facies, and sea-level changes around the Devonian-Carboniferous boundary in the eastern Anti-Atlas (SE Morocco). *Palaeogeography, Palaeoclimatology, Palaeoecology*, 310: 340-364.
- [70] KARPINSKY, A. P., 1885. Geological studies conducted in the South Urals in the summer of 1884. *Izvestiya Geologicheskogo Komiteta*, 4: 323-339. [in Russian]
- [71] KIND, N.V., 1944. Goniates and Clymenoida in the Upper Devonian of the Western Mugodzhsars. *Uchenye zapiski Leningradskogo Universiteta, Seriya geologo-pochvennykh nauk*, 11: 137-166. [in Russian]
- [72] KINDLE, E. M., 1909. The Devonian fauna of the Ouray Limestone. Washington: U. S. Geological Survey Bulletin, 391: 60 pp.
- [73] KOCHETKOVA, N. M., LUTFULLIN, YA. L., PAZUKHIN, V. N. and ARZHAVITINA, M. J., 1980. New data on stratigraphy of the Devonian-Carboniferous boundary deposits in the Verkhneural'sk region. In: Yusupov, B. M., Ed., *Stratigrafiya i paleontologiya paleozoya Yuzhnogo Urala, Bashkiriya*, 26-33. Ufa: Bashkirskoe otdelenie Akademii Nauk SSSR. [in Russian]
- [74] KOCHETKOVA, N. M., PAZUKHIN, V. N., REITLINGER, E. A. and SINITSYNA, Z. A., 1985. Reference sections of the Devonian-Carboniferous boundary deposits in the South Urals. In: Shilo, N. A., Ed., *Biostratigraphy of the Devonian-Carboniferous boundary*. Magadan: Severo-Vostochniy Kompleksniy Nauchno-Isledovatel'skiy Institut, Dal'nevostochniy Nauchniy Centr, Akademiya Nauk SSSR. Preprint, Vypusk 6, 66 pp. [in Russian]
- [75] KOLOTUKHINA, S. E., 1938. On the problem of the clymeniid facies of the Neodevonian of central Kazakhstan. *Izvestiya Akademii Nauk SSSR, Otdelenie Matematicheskikh i Estestvennykh Nauk*, 5-6: 671-686. [in Russian]

- [76] KOMATSU, T., KATO, S., HIRATA, K., TAKASHIMA, R., OGATA, Y., OBA, M., NARUSE, H., TA, P. H., NGUYEN, P. D., DANG, H. T., DOAN, T. N., NGUYEN, H. H., SAKATA, S., KAIHO, K. and KÖNIGSHOF, P., 2014. Devonian-Carboniferous transition containing a Hangenberg Black Shale equivalent in the Pho Han Formation on Cat Ba Island, northeastern Vietnam. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 404: 30-43.
- [77] KONONOVA, L. I., 1975. The significance of conodonts for different facial sections correlation of the Devonian-Carboniferous boundary deposits. *Byulleten Moskovskogo Obshchestva ispytatelei prirody, Otdel Geologicheskii*, 50: 154-155. [in Russian]
- [78] KONONOVA, L. I. and LIPINA, O. A., 1971. The correlation of zonal schemes of foraminifers and conodonts of the upper Famennian and lower Tournaisian in the western slope of the South Urals. *Voprosy mikropaleontologii*, 14: 39-69. [in Russian]
- [79] KONONOVA, L. I. and WEYER, D., 2013. Upper Famennian conodonts from the Breternitz Member (Upper Clymenioid Beds) of the Saalfeld region in Thuringia (Germany). *Freiberger Forschungshefte, C 545*: 15-97.
- [80] KORN, D., 1981. *Cymaclymenia*-eine besonders langlebige Clymenien-Gattung (Ammonoidea, Cephalopoda). *Neues Jahrbuch für Geologie und Paläontologie Abhandlungen*, 161: 172-208.
- [81] 1999. Famennian ammonoid stratigraphy of the Ma'der and Tafilalt (Eastern Anti-Atlas, Morocco). *Abhandlungen der Geologischen Bundesanstalt*, 54: 147-179.
- [82] 2002. Die Ammonoideen-Fauna der *Platyclymenia annulata*-Zone vom Kattensiepen (Oberdevon, Rheinisches Schiefergebirge). *Senckenbergiana Lethaea*, 82: 557-608.
- [83] KOZITSKAYA, R. I., KOSENKO, Z. A., LIPNJAGOV, O. M. and NEMIROVSKAYA, T. I., 1978. Carboniferous conodonts of the Donets Basin. Kiev: Naukova dumka, 136 pp. [in Russian.]
- [84] KRESTOVNIKOV, V. N. and KARPYSHEV, V. S., 1948. Fauna and stratigraphy of the Etroeungt beds of the Zigan River (South Urals). *Trudy Institut Geologicheskikh Nauk, Akademiya Nauk SSSR, Vypusk 66, Geologicheskaya Seriya*, 21: 29-66. [in Russian]
- [85] KRONBERG, P., PILGER, A., SCHERP, A. and ZIEGLER, W., 1960. Spuren altvariscischer Bewegungen im nordöstlichsten Teil des Rheinischen Schiefergebirges. *Fortschritte in der Geologie von Rheinland und Westfalen*, 3: 1-46.
- [86] KULAGINA, E. I., 1996. Facies types of Tournaisian deposits in the reference section of the western slope of the South Urals. In: Puchkov, V. N., Ed., *Ezhegodnik-1995, Informatsionnye materialy*, 51-53. Ufa: Ufimskiy Nauchnyi Tsentr Rossiskoy Akademii Nauk. [in Russian]
- [87] 2013. Taxonomic diversity of foraminifers of the Devonian-Carboniferous boundary interval in the South Urals. *Bulletin of Geosciences*, 88: 265-282.
- [88] KULAGINA, E. I., NIKOLAEVA, S. V., GOROZHANINA, E. N., KUCHEVA, N. A., STEPANOVA, T. I., ALEKSEEV, A. S., RICHARDS, B. C., PUCHKOV, V. N., KOCHETOVA, N. N., GOROZHANIN, V. M. and KONOVALOVA, V. A., 2015. Carboniferous reference sections: Potential candidates for the base of the Serpukhovian GSSP and organic buildups, South Urals. In: Kulagina, E. I. and Nikolaeva, S. V., Eds., *Post-Congress C3 Trip, 16-19 August, 2015. A Field Guidebook of XVIII International Congress on the Carboniferous and Permian, August 11-15, 2015, Kazan, Russia. St. Petersburg: Svoe Izdatelstvo*, 90 pp.
- [89] KUMPAN, T., BABEK, O., KALVODA, J., FRÝDA, J. and GRYGAR, T. M., 2014. A high-resolution, multiproxy stratigraphic analysis of the Devonian-Carboniferous boundary sections in the Moravian Karst (Czech Republic) and a correlation with the Carnic Alps (Austria). *Geological Magazine*, 151: 201-215.
- [90] LAKIN, J. A., MARSHALL, J. E. A., TROTH, I. and HARDING, I. C., 2016. Greenhouse to icehouse: A biostratigraphic review of latest Devonian- Mississippian glaciations and their global effects. In: Becker, R. T., Königshof, P. and Brett, C. E., Eds., *Devonian climate, sea level and evolutionary events*, 439-464. London: Geological Society of London, Special Publication 423.
- [91] LANE, H. R., 1974. Mississippian of southeastern New Mexico and west Texas- A wedge on wedge relation. *American Association of Petroleum Geologists Bulletin*, 58: 269-282.
- [92] LANE, H. R., SANDBERG, C. A. and ZIEGLER, W., 1980. Taxonomy and phylogeny of some Lower Carboniferous conodonts and preliminary standard post-Siphonodella zonation. *Geologica et Palaeontologica*, 14: 117-164.
- [93] LEBEDEVA, N. S., 1956. Foraminifers from the Etroeungt deposits of the Tengiz Basin. In: Grozdilova, L. P., Ed., *Mikrofauna SSSR, Sbornik 8. Foraminifery, mshanki i ostrakody Russkoy Platformy, Donbassa, Tengizskoy Vpadiny i Kuzbassa*, 39-59. Leningrad: Gostoptekhizdat. Vsesoyuznyi Neftyanoy Nauchno-Issledovatel'skiy Geologorazvedochnyi Institut, Trudy, Novaya Seriya, 98. [in Russian]
- [94] LIBROVITCH, L. S., 1936. Geology of the Kyzyl-Urtazym region, South Urals. Leningrad-Moscow: Glavnaya Redakciya Gorno-toplivnoy i Geologo-razvedochnoy Literatury, Tsentralnyi Nauchnoissledovatel'skiy Geologorazvedochnyi Institut, Trudy 81, 210 pp. [in Russian]
- [95] 1944. Tectonics of the Magnitogorsk and Kizil regions of the South Urals. In: Gorskiy, I. I., Kuznetsov, E. A. and Nalivkin, D. V., Eds., *Geologiya SSSR. Urals. Geologicheskoe opisanie*, 598-606. Leningrad, Moscow: Gosgeolizdat, 12(1), [in Russian]

- [96] LIPINA, O. A., 1955. Foraminifera of the Tournaisian stage and Upper Devonian of the Volga-Ural region and western slope of the Middle Urals. Moscow: Akademiya Nauk SSSR, Institut Geologicheskich Nauk, Geologicheskaya Seriya, Trudy 163, 96 pp. [in Russian]
- [97] 1960. Stratigraphy of the Tournaisian and Devonian-Carboniferous boundary beds of the eastern part of the Russian Platform and western slope of the Urals. Moscow: Gosgortekhizdat. Geolo-gicheskiy Institut, Akademiya Nauk SSSR, Trudy 14, 135 pp. [in Russian]
- [98] 1965. Systematics of the Tournayellidae. Moscow: Geologicheskii Institut, Akademiya Nauk SSSR, Trudy 130, 166 pp. [in Russian]
- [99] LIU, Y.-Q., JI, Q., KUANG, H.-W., JIANG, X.-J., XU, H. and PENG, N., 2012. U-Pb zircon age, sedimentary facies, and sequence stratigraphy of the Devonian-Carboniferous boundary, Dapoushang section, Guizhou, China. *Palaeoworld*, 21: 100-107.
- [100] LOEWINSON-LESSING, F., 1892. Les ammonées de la zone à *Sporadoceras Münsteri* dans les monts Gouberlinskaya Gory (gouv. d'Orenburg), Oural meridional. *Bulletin de la Société Belge de Géologie, de Paléontologie et d'Hydrologie*, 6: 15-25.
- [101] LUTFULLIN, YA. L., 1980. Stratigraphy and brachiopods from the Lower Carboniferous of the eastern slope of the South Urals. In: Kamaletdinov, M. F., Ed., Report on the 2nd section of the project: "Patterns in the evolution of the fauna in the Carboniferous and Permian of the South Urals and their significance for the development of detailed stratigraphic schemes", 242. Ufa: Institut Geologii, Akademiya Nauk SSSR, Bashkirskiy filial. [in Russian]
- [102] LYASHENKO, A. I., 1959. Atlas of brachiopods and stratigraphy of the Devonian deposits of the Russian Platform. Moscow: Gostoptekhizdat, 452 pp. [in Russian]
- [103] MALAKHOVA, N. P., 1963. New data on stratigraphy of the Paleozoic of the Magnitogorsk Synclinorium. In: Pronin, A. A. and Papulov, G. N., Eds., *Sbornik 7 po voprosam stratigrafii. Stratigrafiya i fauna paleozoya Urala*, 53-76. Sverdlovsk: Institut Geologii, Akademiya Nauk SSSR, Uralskiy filial. Trudy 65. [in Russian]
- [104] 1965. Problems of stratigraphy of the greenstone complex of the eastern slope of the South Urals. Sverdlovsk: Institut Geologii, Akademiya Nauk SSSR, Uralskiy filial. Trudy 75, 129 pp. [in Russian]
- [105] MARKOVSKY, B. P., 1948. A review of the Devonian stratigraphy on the western slope of the Middle and South Urals. In: Nalivkin, D. V., Ed., *Materialy Vsesoyznogo Nauchno-Issledovatel'skogo Geologicheskogo Instituta, Obshchaya Seriya*, 22-38. Moscow-Leningrad: Gostoptekhizdat. Sbornik 8. [in Russian]
- [106] MARTYNOVA, M. V., 1961. Stratigraphy and brachiopods of the Famennian Stage of western central Kazakhstan. Moscow: Izdatel'stvo Moskovskogo Universiteta, *Materialy po geologii Tsentralnogo Kazakhstana*, 2, 212 pp. [in Russian]
- [107] MASLOV, V. A., Ed., 1987. Fauna and biostratigraphy of the Devonian-Carboniferous boundary deposits in Berchogur (Mugodzhary). Moscow: Nauka, 121 pp. [in Russian]
- [108] MASLOV, V. P., 1949. Alga *Girvanella*, its ecology and stratigraphic significance. *Byulleten Moskovskogo Obshchestva Ispytatelei Prirody, Otdel Geologicheskii*, 24: 89-100. [in Russian]
- [109] MIZENS, A. G., 2002. Famennian brachiopods of the Dzerzhinka Section (vicinity of Verkhneuralsk, eastern slope of the South Urals). In: Koroteev, V. A., Ed., *Ezhegodnik-2001. Informatsionnyi sbornik nauchnykh trudov*, 70-75. Yekaterinburg: Institut geologii i geokhimii, Uralskoe otdelenie, Rossiyskaya Akademiya Nauk. [in Russian]
- [110] 2006. The first finds of representatives of the genera *Zilimia* and *Dzieduszyckia* (Brachiopoda) in the Famennian limestones in the vicinity of Verkhneuralsk (eastern slope of the South Urals). In: Koroteev, V. A., Ed., *Ezhegodnik-2005. Informatsionnyi sbornik nauchnykh trudov*, 28-33. Yekaterinburg: Institut geologii i geokhimii, Uralskoe otdelenie, Rossiyskaya Akademiya Nauk. [in Russian]
- [111] 2009. *Parapugnax?* *Tumidus* - A new South Ural species of the Famennian rhynchonellids (Brachiopoda). In: Koroteev, V. A., Ed., *Ezhegodnik-2008. Informatsionnyi sbornik nauchnykh trudov*, 34-37. Yekaterinburg: Institut geologii i geokhimii, Uralskoe otdelenie, Rossiyskaya Akademiya Nauk. [in Russian]
- [112] 2012. Brachiopods and biostratigraphy of the Upper Devonian of the Middle and South Urals. Yekaterinburg: Institut geologii i geokhimii, Uralskoe otdelenie, Rossiyskaya Akademiya Nauk, 324 pp. [in Russian]
- [113] MIZENS, G. A., 2002. Sedimentary basins and geodynamic settings in the Late Devonian-Early Permian of the southern Urals. Yekaterinburg: Institut geologii i geokhimii, Uralskoe otdelenie, Rossiyskaya Akademiya Nauk, 190 pp. [in Russian]
- [114] MIZENS, G. A., CHERNYKH, V. V. and MIZENS, L. I., 2002. The Famennian shelf zone deposits of the Magnitogorsk island arc in the South Urals. *Litosfera*, 1: 72-76. [in Russian]
- [115] MIZENS, G. A., KUCHEVA, N. A., STEPANOVA, T. I., MIZENS, L. I., TOLOKONNIKOVA, Z. A., IVANOVA, R. M. and RYLKOV, S. A., 2011. Stratigraphy of Paleozoic deposits of the southwestern margin of western Siberia. 2. Stratigraphy and depositional settings of the Devonian and Carboniferous of the Tobol-Ubagan Uplift and Vagai-Ishim Basin. *Litosfera*, 4: 20-44. [in Russian]
- [116] MOSSONI, A., CARTA, N., CORRADINI, C. and SPALLETTA, C., 2015. Conodonts across the Devonian-Carboniferous boundary in SE Sardinia (Italy). *Bulletin of Geosciences*, 90: 371-388.

- [117] MÜLLER, K. J., 1956. Zur Kenntnis der Conodonten-Fauna des europäischen Devons; 1: Die Gattung *Palmatolepis*. Abhandlungen und Senckenbergischen Naturforschenden Gesellschaft, 494: 1-70.
- [118] MÜNSTER, G. GRAF ZU., 1832. Ueber die Planuliten und Goniatiten im Uebergangs-Kalk des Fichtelgebirges. Bayreuth: Birner, 38 pp.
- [119] 1839. Nachtrag zu den Goniatiten des Fichtelgebirges. Beiträge zur Petrefactenkunde, 1: 16-31.
- [120] MURCHISON, R. I., 1840. Description de quelques-unes des coquilles fossiles les plus abondantes dans les couches dévoniennes du Bas-Boulonnais. Bulletin de la Société géologique de France, 11: 250-257.
- [121] NALIVKIN, D. V., 1926. On the geological structure of the South Urals. Zapiski Leningradskogo Gornogo Instituta, 7: 71-95. [in Russian]
- [122] 1927. Report on the work between the Zilim and Zigan rivers in 1925. Izvestiya Geologicheskogo Komiteta, 45: 224-225. [in Russian]
- [123] 1937a. Brachiopods of the Upper and Middle Devonian and Lower Carboniferous of north-eastern Kazakhstan. Leningrad-Moscow: Glavnaya Redaktsiya gorno-toplivnoy i geologo-razvedochnoy literatury, Tsentralnyi Nauchno-issledovatel'skiy Geologorazvedochniy Institut, Trudy 99, 199 pp. [in Russian]
- [124] 1937b. Sterlitamak traverse of the South Urals. In: Nalivkin, D. V., Ed., XVII International Geological Congress. Permian Excursion. Southern Route, 93-116. Leningrad-Moscow: Gosgeolizdat. [in Russian]
- [125] Ed., 1947. Atlas of the index fossil taxa of the fossil faunas of the USSR, 3, Devonian system. Moscow-Leningrad: Gosgeolizdat, 246 pp. [in Russian]
- [126] 1979. Brachiopods of the Tournaisian Stage of the Urals. Leningrad: Nauka, 248 pp. [in Russian]
- [127] NALIVKINA, A. K., 1953. Upper Devonian goniatitids and clymeniids of the Mugodzhar. Leningrad, Moscow: Gostoptekhizdat. Vsesoyuznyi Neftyanoy Nauchno-issledovatel'skiy Geologorazvedochniy Institut, Novaya seriya, Trudy 72, 125 pp. [in Russian]
- [128] NICOLLIN, J.-P., 2004. Revision and stratigraphical importance of "Spirifer julii" Dehée, 1928, a typical spiriferid species from uppermost Devonian. The Palaeontology Newsletter, 57: 172.
- [129] NICOLLIN, J.-P. and BRICE, D., 2004. Biostratigraphical value of some Strunian (Devonian, uppermost Famennian) Productidina, Rhynchonellida, Spiriferida, Spiriferinida brachiopods. Geobios, 37: 437-453.
- [130] NIKITIN, I. F., Ed., 1991. Resolutions of the 3rd Kazakhstan Conference on Stratigraphy of the Precambrian and Phanerozoic. Part 1. Precambrian and Paleozoic. St. Petersburg: Nauchno-Issledovatel'skiy Geologicheskii Institut, 150 pp. [in Russian]
- [131] NIKOLAEVA, S. V. and BOGOSLOVSKY, B. I., 2005. Clymeniids (Suborder Clymeniina). Devonian ammonoids, IV. Moscow: Paleontologicheskii Institut Rossiyskaya Akademiya Nauk, Trudy 287, 220 pp. [in Russian]
- [132] OVER, D. J., 1992. Conodonts and the Devonian-Carboniferous boundary in the upper Woodford Shale, Arbuckle Mountains, South-Central Oklahoma. Journal of Paleontology, 66: 293-311.
- [133] PAPROTH, E., 1980. The Devonian-Carboniferous boundary. Lethaia, 13: 287.
- [134] PAPROTH, E. and STREEL, M., 1984a. The IUGS Devonian-Carboniferous Working Group: A report on activities, 1978-1984. Courier Forschungsinstitut Senckenberg, 67: 5-9.
- [135] 1984b. Precision and practicability: On the definition of the DCB. Courier Forschungsinstitut Senckenberg, 67: 255-258.
- [136] PAPROTH, E., FEIST, R. and FLAJS, G., 1991. Decision on the Devonian-Carboniferous boundary stratotype. Episodes, 14: 331-336.
- [137] PAZUKHIN, V. N., 1980. Upper Famennian and Tournaisian conodonts from the Bol'shaya Kush-Elga section (South Urals). In: Yusupov, B. M., Ed., Stratigrafiya i fauna devona i karbona Yuzhnogo Urala, 26-32. Ufa: Institut geologii. [in Russian]
- [138] 1989a. "Tournaisian conodonts of the Urals". Unpublished Ph.D. dissertation, Lomonosov Moscow State University, Moscow, 196 pp. [in Russian]
- [139] 1989b. Conodonts of the Murzakaevian Horizon (Upper Famennian) of the Urals and Cisuralia. In: Tchibrikova, E. V., Ed., Biostratigrafiya devona i karbona Urala, 36-40. Ufa: Institut geologii. [in Russian]
- [140] PAZUKHIN, V. N. and BARYSHEV, V. N., 1997. Conodont assemblages of the Famennian-Tournaisian deposits of the Bashkirian Cisuralia. In: Lozin, E. B., Ed., Biostratigrafiya i neftegazonosnost paleozoya bashkirskogo Priuraliya, 49-62. Ufa: Bashnipineft, Vypusk 93. [in Russian]
- [141] PAZUKHIN, V. N., KULAGINA, E. I. and SEDAEVA, K. M., 2009. The Devonian-Carboniferous boundary on the western slope of the South Urals. In: Puchkov, V. N., Ed., Carboniferous Type Sections in Russia and Potential Global Stratotypes: Southern Urals Session. Proceedings of the International Field Meeting "The historical type sections, proposed and potential GSSP of the Carboniferous in Russia" (Ufa-Sibai, August 13-18, 2009), 22-33. Ufa: Designpolygraphservice. [in Russian]
- [142] PERNA, E. YA., 1912. The Paleozoic of the eastern slope of the Urals between the town of Verkhneuralsk and Magnitnaya Station. Izvestiya Geologicheskogo Komiteta, 31: 333-383. [in Russian]
- [143] 1914. Ammonoids of the Upper Neodevonian of the eastern slope of the Urals. St. Petersburg: Tipografiya M. M. Stasulevicha, Geologicheskii Komitet, Novaya seriya, Trudy 99, 114 pp. [in Russian]

- [144] 1915. Upper Devonian trilobites from the environs of the town Verkhneursk, Orenburg Region. Petrograd: Tipografiya M. M. Stasulevicha, Geologicheskii Komitet, Novaya seriya, Trudy 138, 58 pp. [in Russian]
- [145] PLYUSNIN, K. P. and PLYUSNINA, A. A., 1962. On the stratigraphy of the Lower Carboniferous in the Magnitogorsk Synclinorium. In: Pervago, V. A., Ed., Materialy po geologii i poleznym iskopaemym Urala, 75-87. Moscow: Gosgeoltekhizdat, Vypusk 10. [in Russian]
- [146] PLYUSNINA, A. A., 1973. On the Devonian-Carboniferous in the Verkhneursk District in the South Urals. Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, 5: 116-122. [in Russian]
- [147] PLYUSNINA, A. A. and CHUVASHOV, B. I., 1988. Devonian-Carboniferous boundary beds in the vicinity of Verkhneursk (eastern slope of the South Urals). In: Golubtsov, V. K., Ed., Granitsa devona i karbona na territorii SSSR, 166-170. Minsk: Nauka i Tekhnika. [in Russian]
- [148] POJARKOV, B. V., 1969. Devonian stratigraphy and foraminifers of Tien-Shan. Frunze: Ilim, 186 pp. [in Russian]
- [149] POTY, E., DEVUYST, F.-X. and HANCE, L., 2006. Upper Devonian and Mississippian foraminiferal and rugose coral zonations of Belgium and northern France: A tool for Eurasian correlations. Geological Magazine, 143: 829-857.
- [150] PUCHKOV, V. N., 2000. Paleogeodynamics of the South and Middle Urals. Ufa: Gilem, 146 pp. [in Russian]
- [151] RAUSER-CHERNOUSOVA, D. M., 1948. Materials on the foraminiferal fauna of the Carboniferous deposits of central Kazakhstan. In: Nalivkin, D. V., Ed., Institut Geologicheskikh Nauk, Akademiya Nauk SSSR, Geologicheskaya Seriya 21, Trudy 66: 1-28. [in Russian]
- [152] REITLINGER, E. A., 1961. Some questions of the systematics of Quasiendothyra. Voprosy mikropaleontologii, 5: 31-68. [in Russian]
- [153] REITLINGER, E. A. and DURKINA, A. V., 1988. The evolution of Famennian and early Tournaisian foraminifera and the problem of the Devonian-Carboniferous boundary. In: Golubtsov, V. K., Ed., Granitsa devona i karbona na territorii SSSR, 254-262. Minsk: Nauka i Tekhnika. [in Russian]
- [154] RHODES, F. H. T., AUSTIN, R. L. and DRUCE, E. C., 1969. British Avonian (Carboniferous) conodont faunas and their value in local and international correlation. London: Bulletin of the British Museum (Natural History), Supplement 5, 313 pp.
- [155] ROEMER, F. A., 1843. Die Versteinerungen des Harzgebirges, 26-32. Hannover: Hahn'sche Hofbuchhandlung.
- [156] 1850. Beiträge zur geologischen Kenntnis des nordwestlichen Harzgebirges. Palaeontographica, 5: 1-46.
- [157] ROTAI, A. P., 1941. Class Brachiopoda. In: Librovič, L. S., Ed., Atlas iskopaemykh form rukovodyashchikh faun SSSR. Nizhnii otdel kamennougolnoi systemy, 85-117. Moscow, Leningrad: Gosgeolizdat, 4. [in Russian]
- [158] ROZMAN, KH. S., 1960. New species of the Devonian camarotoechiids of the Mugodzhary. In: Markovskiy, B. P., Ed., New species of ancient plants and invertebrates of the USSR, 352-360. Moscow: Gosgeoltekhizdat, 1. [in Russian]
- [159] 1962. Stratigraphy and brachiopods of the Famennian Stage of the Mugodzhary and adjacent regions. Moscow: Akademiya Nauk SSSR, Geologicheskii Institut, Trudy 50, 196 pp. [in Russian]
- [160] SALIKHOV, D. N., 1996. The Upper Paleozoic collision phases in the South Urals (stages, stratigraphic units). In: Puchkov, V. N., Ed., Ezhegodnik-1995, 143-149. Ufa: Ufimskiy Nauchnyi Tsentr Rossiskoy Akademii Nauk. [in Russian]
- [161] SALIKHOV, D. N., MOSEYCHUCK, V. M., KHOLODNOV, V.V. and RAKHIMOV, I. R., 2014. Carboniferous volcanointrusional magmatism of the Magnitogorsk-Bogdanovskoe graben in light of new geological-geochemical data. Litosfera, 5: 33-56. [in Russian]
- [162] SANDBERG, C. A., 1976. Conodont biofacies of Late Devonian Polygnathus styriacus Zone in western United States. In: Barnes, C. R., Ed., Conodont paleoecology, 171-186. Toronto: Geological Association of Canada, Special Paper 15.
- [163] SANDBERG, C. A. and DREESEN, R., 1984. Late Devonian biofacies models and alternate shallow-water conodont zonation. In: Clark, D. L., Ed., Conodont biofacies and provincialism, 143-178. Boulder: Geological Society of America, Special Paper 196.
- [164] SANDBERG, C. A. and ZIEGLER, W., 1979. Taxonomy and biofacies of important conodonts of the Late Devonian styriacus-Zone, United States and Germany. Geologica et Palaeontologica, 13: 173-212.
- [165] SANDBERG, C. A., STREEL, M. and SCOTT, R. A., 1972. Comparison between conodont zonation and spore assemblages at the Devonian-Carboniferous boundary in the western and central United States and in Europe. Septième Congrès International de Stratigraphie et de Géologie du Carbonifère, Krefeld 1971, Compte Rendu, 1: 179-203.
- [166] SANDBERG, C. A., ZIEGLER, W., DREESEN, R. and BUTLER J., 1988. Late Frasnian mass extinction: Conodont event stratigraphy, global change and possible causes. Courier Forschungsinstitut Senckenberg, 102: 263-307.
- [167] SANDBERG, C. A., ZIEGLER, W., LEUTERITZ, K. and BRILL, S. M., 1978. Phylogeny, speciation and zonation of Siphonodella (Conodonta, Upper Devonian and Lower Carboniferous). Newsletters on Stratigraphy, 7: 102-120.

- [168] SANDBERGER, G., 1855. *Clymenia subnautilina* (nova species), die erste und bis jetzt einzige Art aus Nassau. *Jahrbücher des Vereins für Naturkunde im Herzogthum Nassau*, 10: 127-136.
- [169] SARYCHEVA, T. G., SOKOLSKAYA, A. N., BEZNOSOVA, G. A. and MAKSIMOVA, S. V., 1963. Brachiopods and paleogeography of the Carboniferous of the Kuznetsk Basin. Moscow: Akademiya Nauk SSSR, Paleontologicheskii Institut, Trudy 95, 548 pp. [in Russian]
- [170] SAVOY, L. E. and HARRIS, A. G., 1993. Conodont biofacies and taphonomy along a carbonate ramp to black shale basin (latest Devonian and earliest Carboniferous), southernmost Canadian Cordillera and adjacent Montana. *Canadian Journal of Earth Sciences*, 30: 2404-2422.
- [171] SCHÄFER, W., 1976. Einige neue Conodonten aus höheren Oberdevon des Sauerlandes (Rheinisches Schiefergebirge). *Geologica et Palaeontologica*, 10: 141-152.
- [172] SCHÖNLAUB, H. P., 1969. Conodonten aus der Oberdevon und Unterkarbon des Kronhofgrabens (Karnisches Alpen, Österreich). *Jahrbuch der Geologischen Bundesanstalt*, 112: 321-354.
- [173] SEDAeva, K. M., RYABINKINA, N. N., KULESHOV, V. N. and VALYAEVA, O. V., 2010. Evidence of the global geological Hangenberg Event at the Devonian-Carboniferous boundary sections of the Subpolar Urals (Kozhim River) and South Urals (Sikaza River). *Litosfera*, 6: 25-37. [in Russian]
- [174] SIMAKOV, K. V., 1985. Reference sections and biostratigraphy of the Devonian-Carboniferous boundary beds. Moscow: Nauka, 248 pp. [in Russian]
- [175] SIMAKOV, K. V., ALEKSEEV, A. S., BARSKOV, I. S., BOGOSLOVSKY, B. I., BYVSHEVA, T. V., GAGIEV, M. H., KONONOVA, L. I., KOCHETKOVA, N. M., KUZINA, L. F., KULAGINA, E. I., ONOPRIENKO, Y. I., PAZUKHIN, V. N., RADIONOVA, A. P., RAZINA, T. P., REITLINGER, E. A., SMIRNOVA, L. V. and YANBULATOVA, M. G., 1985. Devonian-Carboniferous boundary in Mugodzhary. In: Simakov, K. V., Ed., *Biostratigraphy of the Devonian-Carboniferous boundary*. Magadan: Severo-Vostochniy Kompleksniy Nauchno-Isledovatel'skiy Institut, Dal'nevostochniy Nauchniy Tsent, Akademiya Nauk SSSR, Preprint, Vypusk 9, 55 pp. [in Russian]
- [176] SIMAKOV, K. V., BOGOSLOVSKY, B. I., GAGIEV, M. K., KONONOVA, L. I., KOCHETKOVA, N. M., KUZINA, L. F., KULAGINA, E. I., ONOPRIENKO, U. I., PAZUKHIN, V. N., RADIONOVA, E. R., RAZINA, T. P., REITLINGER, E. A., SIMAKOVA, L. V. and YANULTANOVA, M. P., 1983. Biostratigraphy of the Devonian-Carboniferous boundary of the Mugodzhary. In: Shilo, N. A., Ed., *Contribution to the characterization of the Devonian-Carboniferous boundary in the Mugodzhary Hills*. Magadan: Severo-Vostochniy Kompleksniy Nauchno-Isledovatel'skiy Institut, Dal'nevostochniy Nauchniy Tsent, Akademiya Nauk SSSR. Preprint, 51 pp. [in Russian]
- [177] SMIRNOV, G. A. and SMIRNOVA, T. A., 1967. Materials on paleogeography of the Urals. Tournaisian. Sverdlovsk: Institut geologii i geokhimii, 207 pp. [in Russian]
- [178] SOBOLEW, D., 1911. On the Upper Neodevonian of the vicinity of Kelets. *Izvestia Varshavskago Politekhnikeskago Instituta*, 2: 1-14. [in Russian]
- [179] 1912. On the Upper Neodevonian of Lagow. *Izvestia Varshavskago Politekhnikeskago Instituta*, 3: 1-20. [in Russian]
- [180] SOWERBY, J. C., 1840. Explanation of the plates and wood-cuts. *Transactions of the Geological Society of London*, Ser. 2, 5(3): 633-703.
- [181] SPASSOV, C., 1965. Das Karbonatische Oberdevon in Kraiste und seine Conodontenfauna. *Travaux sur la Géologie de Bulgarie, Série Paléontologie*, 7: 71-113.
- [182] STREEL, M., BRICE, D. and MISTIAEN, B., 2006. Strunian. In: Dejonghe, L., Ed., *Current status of chronostratigraphic units named from Belgium and adjacent areas*, 105-109. Brussels: *Geologica Belgica*, 9.
- [183] TCHERNYSHEVA, N. E., 1952. Some new species of foraminifera from the Visean Makarov district (South Urals). In: Markovskiy, B. P., Ed., *Paleontologiya i Stratigrafiya*, 14-23. Leningrad: Gosgeoltekhizdat. [in Russian]
- [184] TEVELEV, A. V., DEGTYAREV, K. E., KOSHELEVA, I. A. and PRAVIKOVA, N. V., 2003. The Early Carboniferous volcanism of the South Urals and Transuralian zone (the problems of the geodynamic interpretation). In: Karyakin, Yu. V., Ed., *Tektonika i geodynamika kontinentalnoy litosfery. Materialy XXXVI Tektonicheskogo soveschaniya*, 226-230. Moscow: Geos., 2. [in Russian]
- [185] THOMAS, L. A., 1949. Devonian-Mississippian formations of southeast Iowa. *Bulletin of the Geological Society of America*, 60: 403-438.
- [186] TOKARENKO, L., 1903. Fauna of the Upper Devonian limestones of the vicinity of the town of Verkhneuralsk, Orenburg Region. Kazan: Tipo-litografiya Imperatorskogo Universiteta, Obshchestvo Estestvoispytatelei pri Imperatorskom Kazanskom Universitete, Trudy 37, Vypusk 2, 40 pp. [in Russian]
- [187] TOLOKONNIKOVA, Z. A., 2008. Famennian bryozoans of the western part of the Altay-Sayan folded region. Novokuznetsk: Izdatelstvo Kuzbasskoy gosudarstvennoy pedagogicheskoy akademii, Kuzbasskaya gosudarstvennaya pedagogicheskaya akademiya, Paleontologiya Kuzbassa, Vypusk 2, 125 pp. [in Russian]
- [188] TSCHERNYSCHEW, F. N., 1887. Die Fauna des Unteren Devon am Ostabhänge des Ural. *Trudy Geologicheskogo Komiteta*, 3(3): 1-208.
- [189] TUCKER, M. E. and WRIGHT, V. P., 1990. *Carbonate sedimentology*. Oxford: Blackwell Scientific, 482 pp.

- [190] VISSARIONOVA, A.YA., 1950. Fauna of foraminifers in the Devonian deposits of Bashkiria. *Bashkirskaya neft*, 1: 34-37. [in Russian]
- [191] VOGES, V. A., 1959. Conodonten aus dem Untercarbon I und II (Gattendorfia und Pericyclus-Stufe) des Sauerlands. *Paläontologische Zeitschrift*, 33: 266-314.
- [192] VORONTSOVA, T. N. and KUZMIN, A. V., 1989. New *Vjaloviodus* species conodonts. *Paleontologicheskii Zhurnal*, 3: 110-112. [in Russian]
- [193] WALLISER, O. H., 1984. Pleading for a natural D-C boundary. *Courier Forschungsinstitut Senckenberg*, 67: 241-246.
- [194] 1996. Global events in the Devonian and Carboniferous. In: Walliser, O. H., Ed., *Global events and event stratigraphy in the Phanerozoic*, 225-250. Berlin: Springer.
- [195] WATKINS, R., 1985. Volcaniclastic and carbonate sedimentation in Late Paleozoic island arc deposits, eastern Klamath Mountains, California. *Geology*, 13: 709-713.
- [196] 1990. Carboniferous and Permian island-arc deposits of the eastern Klamath terrane, California. In: Harwood, D. S. and Miller, M. M., Eds., *Paleozoic and Early Mesozoic paleogeographic relations; Sierra Nevada, Klamath Mountains, and related terranes*, 193-200. Boulder: Geological Society of America, Special Paper 255.
- [197] 1993. Permian carbonate platform development in an island-arc setting, eastern Klamath terrane, California. *Journal of Geology*, 101: 659-666.
- [198] 1999. Upper Paleozoic biostromes in island-arc carbonates of the eastern Klamath terrane, California. *Paleontological Research*, 3: 1-151.
- [199] WEDEKIND, R., 1908. Die Cephalopodenfauna des höheren Oberdevon am Enkenberg. *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie, Beilage-Band*, 26: 565-635.
- [200] 1913. Weitere Beiträge zur Gliederung des Oberdevon. *Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-Physikalische Klasse*, 1913: 197-205.
- [201] WELLER, S., 1914. The Mississippian Brachiopoda of the Mississippi Valley Basin. Urbana: Geological Survey of Illinois Monographs, 1, 508 pp.
- [202] WHIDBORNE, G. F., 1897. A monograph of the Devonian fauna of the south of England. London: Palaeontographical Society, 51, 344 pp.
- [203] WINCHELL, A., 1863. Descriptions of fossils from the yellow sandstones lying beneath the "Burlington Limestone," at Burlington, Iowa. *Proceedings of The Academy of Natural Sciences of Philadelphia*, 15: 2-25.
- [204] 1865. Descriptions of new species of fossils, from the Marshall Group of Michigan, and its supposed equivalents, in other states; with notes on some fossils of the same age previously described. *Proceedings of The Academy of Natural Sciences of Philadelphia*, 17: 109-133.
- [205] WILSON, J. L., 1975. *Carbonate facies in geologic history*. Berlin: Springer, 471 pp.
- [206] ZIEGLER, W., 1962. Taxinomie und Phylogenie Oberdevonischer Conodonten und ihre stratigraphische Bedeutung. *Abhandlungen des Hessischen Landesamtes für Bodenforschung*, 38: 1-166.
- [207] ZIEGLER, W. and HUDDLE, J. W., 1969. Die *Palmatolepis glabra*-Gruppe (Conodonta) nach der Revision der Typen von Ulrich & Bassler durch J. W. Huddle. *Fortschritte in der Geologie von Rheinland und Westfalen*, 16: 377-386.
- [208] ZIEGLER, W. and SANDBERG, C. A., 1984. *Palmatolepis*-based revision of upper part of standard Late Devonian conodont zonation. In: Clark, D. L., Ed., *Conodont biofacies and provincialism*, 179-194. Boulder: Geological Society of America, Special Paper 196.
- [209] 1990. The Late Devonian Standard Conodont Zonation. *Courier Forschungsinstitut Senckenberg*, 121: 1-115.
- [210] 1996. Reflexions on Frasnian and Famennian Stage boundary decisions as a guide to future deliberations. *Newsletters on Stratigraphy*, 33: 157-180.
- [211] ZIEGLER, W., SANDBERG, C. A. and AUSTIN, R. L., 1974. Revision of *Bispathodus* group (Conodonta) in the Upper Devonian and Lower Carboniferous. *Geologica et Palaeontologica*, 8: 97-112.