NOTES

SOME BOUNDARY PROBLEMS DISCUSSED AT THE 27TH INTERNATIONAL GEOLOGICAL CONGRESS, MOSCOW, USSR: 4TH TO 14TH AUGUST, 1984

The 27th International Geological Congress was held in Moscow, USSR from 4th to 14th August, 1984. 5630 Geologists (including 95 from India) from 92 countries, representing all the continents of the world were registered for the 27th Session of IGC. 2000 Scientific papers were contributed by these geologists in 24 sections and 18 colloquia.

The criterion for defining the base of Silurian System were discussed at the meeting of the subcommission on Silurian System and it was proposed that the boundary stratotype for the base of Silurian System should be at Dob's Linn, Scotland and that this horizon should be at a point within the lower part of the Birkhil Shale coinciding with the base of the *acuminatus* Biozone. Issues concerning the Pridoli Series and various proposals relating to the horizon and to the Porary stratotype were discussed. It was resolved that earlier decision regarding Porary stratotype for the Pridoli Series should stand. It was also suggested that future activities of the Silurian subcommission should include the question of subdivision of the Pridoli Series and the establishment of Chronozones.

On the basis of a decision taken at the meeting of the subcommission on Devonian stratigraphy, the Lower Devonian has been subdivided into three standard stages, namely, Lockkovian, Pragian and Emsian. The base of Lockkovian has been defined in the stratotype at Klonk as the base of the *Monograptus uniformis* graptolite Zone which lies slightly above the base of *Icriodus woschmidti* conodont Zone. The base of Pragian has been defined in the stratotype at Kosor (Barrandian area), in the close proximity of the upper boundary of *Monograptus hercynicus* graptolite Zone and within the upper part of *Paranowakia geinitziana* tentaculites Zone. It was suggested that Emsian may be subdivided into two units of stage or substage rank to which the term Zlichovian and Delejan were proposed. The lower boundary of Zlichovian may lie at the base of *Polygnathus dehiscens* conodont Zone. The base of Delejan may correspond to the base of the *Nowakia cancellata* Zone which corresponds approximately to the upper range of *Anetoceras* goniatite fauna.

The Devonian-Carboniferous boundary in South China was discussed and it was proposed that this boundary be defined on the basis of the first appearance of *Siphonodella sulcata* in the uppermost part of Daihua Formation.

Some problems regarding the 'world time scale' for the Permian System were discussed. These problems have arisen primarily due to the fact that the Lower Permian reflects strong climatic differentiation and limited geographic distribution of organisms. In the Upper Permian, the world climate was warming and the progresssve regression and diminution of faunas on the continental areas posed problems of correlation. To overcome these difficulties it was proposed that the stages in the type area of Permian in the USSR for the Lower Permian be recognized and accepted. The main units for the world scale would be Asselian, Sakmarian, Artinskian and Kungurian. These stages are primarily delineated on the basis of ammonoids and fusilinids. It was suggested that work needs to be done to define

the base of the Asselian and its relationship with the Carboniferous. It was also proposed that reasonable consensus may be worked out to finalise the world scale for the Upper Permian after detailed investigation of sections exposed in Transcaucasus, China and the United States. It may be pointed out that the accepted Permian subdivision of the USSR is primarily based on evolution of fusilinids including 9 stages and 21 zones. The ammonoids recovered/described from the fusilinid zones of the 'Tethyan Scale' permit wide inter-regional correlation. Heinz Kozur (Hungary) was of the opinion that the Carboniferous and Permian boundary may be defined between Asselian and Sakmarian Stages, as the former has yielded a Carboniferous fauna. Kozur proposed three fold subdivision of Permian, i.e., Lower Permian (Sakmarian, Artinskian, Leonardian = Kungurian and Chihsian Stages), Middle Permian (Kubergandinian, Wordian and Capitanian Stages) and Upper Permian (Abadehian, Dzhulfian and Changsingian Stages). According to him Dorashamian represents only the Lower Changhsingian.

Four brachiopod zones *(Derbyia grandis-Spirigerella grandis, Derbyia hemisphaerica-Marginifera ornata, Megasteges nepalensis-Derbyia altestriata* and *Enteletes socialis* Zones) were porposed within the Upper Permian (excepting the Kathwai Member) of Salt Range, Pakistan.

Yang Zungi (China), Kozur (Hungary) and Gupta (India) proposed that the boundary between the Permian and Triassic may be placed between the *Otoceras woodwardi* Zone of topmost Changhsingian and the *Ophiceras tibeticum* Zone of lowermost Triassic. It was remarked that with the help of conodonts (first appearance of *Isarcicella isarcica)* and ostracodes (first appearance of *Hollinella tingi)* the top of the *Otoceras woodwardi* Zone can be traced in the whole of Northern Hemisphere. These conodonts and ostracods appear immediately above the last occurrence of the genus *Otoceras,* but they can also be found in beds without macrofossils. It was pointed out that the brachiopods recorded from the *Otoceras woodwardi* Zone support Permian affinities of this zone.

Triassic ammonoid time scale was discussed in the meetings of the subcommission on Triassic System. It was pointed out that the Gangetian Stage is characterized by the presence of *Otoceras woodwardi* whereas *Ophiceras connectens* Zone in Salt Range corresponds with the *Otoceras woodwardi* and *Ophiceras tibeticum* Zones. The base of Artinskian is considered to be marked by the *Keyserlingites subrobustus* Zone, an equivalent of the *Neopopanoceras haugi* Zone. It was pointed out that the Anisian/Ladinian boundary be placed between the *Paraceratites trinodosus* and *Protrachyceras reitzi* Zones. Kozur suggested that the beds above the *Trachyceras aon* Zone be subdivided into three zones, i.e., the lowest one with *Trachyceras* only, the middle with *Trachyceras* and *Sirenites* and the upper without *Trachyceras,* but with *Sirenites.* These three zones coincide exactly with the *Trachyceras aonoides, Trachyceras (Austrotrachyceras) austriacum* and the *Sirenites* Subzones. The base of Julian was proposed to be placed at the base of *Austrotrachyceras austriacum* Zone whereas the Cordvolian is marked by the *Frankites sutherlandi, Trachyceras aon* and *Trachyceras aonoides* ammonoid Zones. It was suggested that the *Rhabdoceras suessi* Zone may be substituted by three zones (1) *Sagenites giebeli* Zone, (2) *Cochloceras suessi* Zone, and (3) *Choristoceras haueri* Zone. The first two are placed within the Sevatian (Upper Norian) whereas the later is considered as the base of Rhaetian.

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