

## CONODONTS FROM THE LOWER DUMUGOL SHALE (LOWER ORDOVICIAN) OF THE CHEUNGSAN-SABUK AREA, JEONGSEON-GUN, KANGWEON-DO

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### ABSTRACT

Early Ordovician conodonts from several localities of the lower Dumugol Shale on the northern limb of the Paekunsan syncline, southern Jeongseon area are described. The conodont collection consists almost entirely of coniform elements and some are pectiniforms. Two conodont biostratigraphic zones are recognized in the lower part of the formation, namely *Chosonodina herfurthi-Rossodus manitouensis* Zone and *Scolopodus quadraplicatus* Zone in stratigraphic order. These biostratigraphic schemes are essentially equivalent to those (Seo, 1990) of the southern part of the syncline. The *C. herfurthi-R. manitouensis* Zone and *S. quadraplicatus* Zone are correlated with the Fauna C to the lower part of the Fauna D of the Early Ordovician in North American Midcontinent, with the *C. herfurthi-Acodus* Zone and *Scalpellodus tersus* Zone in North China, with the *C. herfurthi-Acodus* Zone and *Drepanodus? gracilis-S. sexplicatus* Zone in Australia, with the Zone 7 in Iran and with the upper part of the *Cordylodus angulatus*, and *Drepanoistodus deltifer* Zone in Northern Europe, all of which are equivalent approximately to the late Tremadocian in Europe.

### INTRODUCTION

The Dumugol Shale, ca. 120 m thick, was denominated by Yamanari (1926) in the southern limb of the Paekunsan syncline. The formation overlies conformably the Dongjeom Quartzite, and underlain conformably by the Maggol Limestone. In the Cheungsan-Sabuk area, the formation is fairly well exposed with EW trend although some displacements are present in places by NE-trending faults. Lithologically, it is characterized by frequent alternation of shale and limestone. Shales are mostly calcareous in composition, and gray to greenish-gray on fresh surfaces and light yellowish-green on weathered surfaces.

Kobayashi (1966) described abundant macroinvertebrates from the Dumugol Shale in the localities of his Daegi-Dongjeom section, and proposed two biostratigraphic zones, the lower *Asaphellus* and the upper *Protopliomerops* zones, for the formation. He also correlated them respectively with the faunas of the Tremadocian in Europe and the Canadian in North America.

Lee (1970, 1975) described some conodont assemblages of the Dumugol Shale in the Dongjeom area, Taebaeg City. Choi (1988) reported 12 species of macroinvertebrates of various kind from the formation in the Gumunso area, Dongjeom-ri, and correlated the fauna to the Tremadocian.

Recently Seo(1990) established four conodont biostratigraphic zones in the Dumugol Shale in the southern area of the Paekunsan syncline, Yeongweol and Samcheog areas. Until recently, conodont data of the formation in the northern area of the syncline, however, have been not reported as yet.

Therefore, the objectives of this study are: 1) systematically describing the conodonts from the lower part of the Dumugol Shale in the northern area of the Paekunsan syncline, southern Jeongseon-gun, 2) establishing zonation and correlating it with those of the southern area of the syncline, and 3) redefining the lower limit in age of the formation.

This work was carried out as a part of the M. Sc. thesis of the senior writer (1983) and additional revision was accomplished in this work with supplement of material. Geologic map with sample locations is provided in Figure 1. All of the conodont specimens are deposited at Department of Geology, Yonsei University, Seoul.

### SAMPLE LOCALITIES

The study area lies around Sabuk-Cheungsan, southern Jeongseon-gun which structurally corresponds to the northern limb of the Paekunsan syncline.

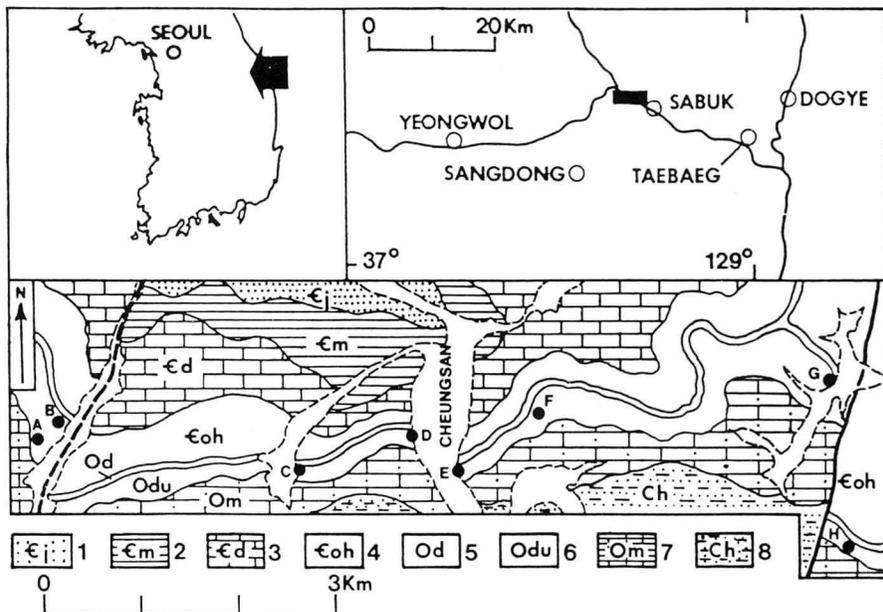


Fig.1. Geological map of the Dumugol Shale in the Cheungsan-Sabuk area showing sample localities. Key to lithostratigraphic unit: 1, Jangsan Quartzite; 2, Myobong Slate; 3, Daegi Formation; 4, Hwajeol Formation; 5, Dongjeom Quartzite; 6, Dumugol Shale; 7, Maggol Limestone; and 8, Hongjeom Formation. Key to sample location: A, Western mountain slope of Chamiwon Elementary School; B, Chunggan village; C, Cheoksan; D, Cheungsan Railroad side, Mureung-ri; E, Opposite side of D; F, Peak of Absan, Mureung-ri; G, Chikjeon; and H, Sabuk areas.

Area	Korea This study	North Atlantic Lindström 1971 Bergstrom 1977,1981		North America Ethington & Clark 1971	Australia Druce & Jones 1971	Iran Müller 1973	North China An et al. 1983	
Arenigian	Maggol Limestone		Latorp	3	E	Post-Warendian	<i>serratognathus bilobatus</i>	Liangjashan Formation
				2				
				1				
Tremadocian	Dumugol Shale	<i>Drepanoistodus deltifer</i> <i>Cordylodus angulatus</i>	Ceratopyge Beds	D	Drepanodus ?gracilis- Scolopodus sexplicatus	Warendian	<i>Scalpellodus tersus</i> <i>S. quadraplicatus</i> - <i>S. opimus</i>	Yell Formation
				C				
	Dongjeom Quartzite				B	<i>Chosonodina</i> <i>herfurthi-acodus</i>	Datsonian	<i>Cordylodus rotundatus</i> - <i>Acodus oneotensis</i>
						<i>C. rotundatus</i> <i>C. angulatus</i> <i>C. prion</i>		
					A (part)	<i>C. oklahomensis</i> <i>C. lindstroemi</i> <i>O. bicuspatus</i>		

Fig.2. Intercontinental correlation of conodont biozones in the Lower Ordovician.

Twenty-two samples were collected from the Dumugol Shale at seven different localities, including Chamiwon, Cheoksan, Cheungsan, Chikjeon, and Sabuk areas (Fig. 1). Of them, sixteen yielded 638 identifiable conodonts. Conodont distribution of these fossiliferous samples is shown in Table 1.

## CONODONT BIOSTRATIGRAPHY

The stratigraphic distribution of the recovered conodonts is very similar to those of the southern regions of the Paekunsan syncline (Seo, 1990). The conodont collection consists almost entirely of conodonts with some pectiniforms. Of them, scolopodid is the most abundant taxa, comprising 42% of all collection. It seems that this genus had more wider ecologic tolerance in Early Ordovician than its associates.

Two biostratigraphic zones are recognized here in the lower part of the Dumugol Shale, namely *Chosonodina herfurthi*-*Rossodus manitouensis* Zone and *Scolopodus quadraplicatus* Zone in stratigraphic order. The lower zone was recognized in the Cheungsan and Chikjeon areas. It is, however, difficult to define the exact biostratigraphic level in the Chamiwon and Cheoksan areas owing to paucity and poor preservation of material. Only two fragmentary specimens which are tentatively assigned to *Acontiodus* sp. and *Drepanodus* sp. were recovered from samples near Chamiwon Elementary School. The biostratigraphic implication of the conodont fauna in each zone is summarized as follows.

#### A. *Chosonodina herfurthi*-*Rossodus manitouensis* Zone

The following samples from the lower 15 meter interval of the formation in the Cheungsan area contain stratigraphically important conodont taxa, including *Acanthodus lineatus*, *Chosonodina herfurthi*, *Cordylodus angulatus*, *C. cf. rotundatus*, *Drepanoistodus pervetus*, *Rossodus manitouensis* and *Scolopodus filiosus*: samples 720, 1293, 1298, 1299, 1300, 1301, and 1302. The *Chosonodina herfurthi*-*Rossodus manitouensis* Zone was recognized at this stratigraphic interval.

In the Chikjeon area, the characteristic conodont taxa of the *Chosonodina herfurthi*-*Rossodus manitouensis* Zone are recovered from the samples 1304 to 1306 together with some forms including *Drepanodus arcuatus*, *Scolopodus bassleri* and *S. filiosus*. In consideration of the stratigraphic occurrence of the represented conodonts, however, this interval is probably assignable to the *Chosonodina herfurthi*-*Rossodus manitouensis* Zone.

Although Early Ordovician conodonts recovered from the formation at Cheoksan area, including *Acontiodus cf. iowensis* and *Paltodus inconstans* are relatively long ranging, they are most abundant in strata of late Tremadocian age, particularly in *Chosonodina herfurthi*-*Rossodus manitouensis* Zone and *Scolopodus quadruplicatus* Zone of the southern synclinal faunal units (Seo, 1990).

#### B. *Scolopodus quadruplicatus* Zone

Two samples above 15 meters from the base of the Dumugol Shale, sample 1272 and 1292 in the Cheoksan area, yielded conodonts assignable to the *S. quadruplicatus* Zone. Diagnostic species of this zone include *Acanthodus gracilis*, *Oistodus lanceolatus*, *Scandodus rectus*, *S. bassleri* and *S. quadruplicatus*. Because of the limited number of samples in this study, the upper boundary of the *S. quadruplicatus* Zone is not defined.

Also, samples 1313 and 1314 from 20-25 meters higher of the formation at Sabuk area contain the following significant conodont taxa: *Acontiodus cf. propinquus*, *Drepanodus cf. arcuatus*, *D. conavus*, *Drepanoistodus forceps*, *Oneotodus gracilis*, *O. variabilis*, *Scolopodus filiosus* and *S. quadruplicatus*. This co-occurrence of the conodont species suggests that the stratigraphic interval may belong to the lower part of the *S. quadruplicatus* Zone.

Two biostratigraphic zones proposed herein can be correlated with those of several parts of the world. The *Chosonodina herfurthi*-*Rossodus manitouensis* Zone and *Scolopodus quadruplicatus* Zone is correlated with the Fauna C and the lower part of the Fauna D of the Early Ordovician conodont zones in North America, with the upper part of the *Cordylodus rotundatus*-*Acodus oneotensis* Zone and *Scalpellodus tersus* Zone in North China, with the *C. herfurthi*-*Acodus* Zone and *Drepanodus gracilis*-*Scolopodus sexplicatus* Zone in Australia, with the Zone 7 in Iran, and with the upper part of the *Cordylodus angulatus* and *Drepanoistodus deltifer* Zone in Northern Europe, all of which are approximately equivalent to the Late Tremadocian in Europe.

## SYSTEMATIC PALEONTOLOGY

Genus *Chosonodina* Müller, 1964

Type species.--*Chosonodina herfurthi* Müller, 1964

*Chosonodina herfurthi* Müller, 1964 s.f.

pl. 1, fig. 6

1964 *Chosonodina herfurthi* Müller. p. 99, taf. 13, figs. 3a-c.

1968 *Chosonodina herfurthi* Müller. Mound, 1968, p. 408, 409, pl. 2, figs. 1-3.

- 1971 *Chosonodina herfurthi* Müller. Druce & Jones, p. 59, figs. 21b, c, pl. 4, figs. 1-6, 9.  
 1971 *Chosonodina herfurthi* Müller. Ethington & Clark, p. 72, pl. 1, fig. 1.  
 1971 *Chosonodina herfurthi* Müller. Jones, p. 44, 45, pl. 8, figs. 2a-c.  
 1975 *Chosonodina herfurthi* Müller. Cooper & Druce, p. 572, 576, text-fig. 13.  
 1977 *Chosonodina herfurthi* Müller. Repetski & Ethington, p. 96, pl. 1, fig. 4.  
 1982 *Chosonodina herfurthi* Müller. Ethington & Clark, p.28, pl. 2, fig. 12.  
 1982 *Chosonodina herfurthi* Müller. An *et al.*, p. 82, pl. 8, figs. 8, 19.  
 1987 *Chosonodina herfurthi* Müller. An, p. 133, pl. 21, figs. 24, pl. 23, figs. 18-20.  
 1988 *Chosonodina herfurthi* Müller. Pei *et al.*, p. 73, pl. 10, figs. 9-12.  
 1990 *Chosonodina herfurthi* Müller. Seo, p.72, 73, pl. 1, figs. 8-12, text-figs. 1:6.

**Description.**--A palmate pectiniform element with five median denticles and two lateral denticles. Anterior side is convex, but posterior side is antero-posteriorly concave. The median denticles are antero-posteriorly flattened and laterally sharply edged, making diamond-shape in cross section, and forms sharp termination of upper side. The basal cavity extends along the lateral denticle and the lower margin is slightly excavated as a groove. White matter is observed through the entire unit. Fine striae are developed on the denticles.

**Remarks.**--The present specimens agree well with description of the original specimens from South Korea(Müller, 1964). Lindström(1976) described *Acanthodus-Chosonodina-Loxodus* fauna from the Tremadocian of Europe and from the Fauna C of Ethington & Clark(1971) in North America.

**Regional occurrence.**--*Chosonodina herfurthi* occurs in the Lower Ordovician rocks of South Korea(Müller, 1964), in the upper part of the Mckenzie Hill Formation of southern Oklahoma (Mound, 1968), in the Manitou Formation of Colorado(Ethington & Clark, 1971), in the Ninmaroo Formation of Queensland(Druce & Jones, 1971), in the Ordovician of New Zealand(Cooper & Druce, 1975), in the House Limestone of Ibex area, Utah(Ethington & Clark, 1982), in South China (An, 1987), and in the Henan province, China(Pei *et al.*, 1988).

**Range.**--*Chosonodina herfurthi*-*Rossodus manitouensis* Zone.

**Number of specimens**-- 3.

Genus *Rossodus* Repetski & Ethington, 1983

Type species.- *Rossodus manitouensis* Repetski & Ethington, 1983

*Rossodus manitouensis* Repetski & Ethington, 1983

pl. 1, figs. 7-9

- 1964 *Acodus oneotensis* Furnish. Müller, p. 95, 96, pl. 13, figs. la, b, 8.  
 1968 ?*Acodus* sp. Mound, p. 407, pl. 1, figs. 16, 28.  
 1968 ?*Acontiodus bicurvatus* (Stauffer). Mound, p. 407, pl. 1, figs. 17, 29.  
 1968 *Distacodus stola stola* Lindström. Mound, p. 410, pl. 2, fig. 14.  
 1971 *Acodus oneotensis* Furnish. Druce & Jones, p 56, 57, pl. 12, figs. 3a-7c, text-fig. 20.  
 1971 ?*Oistodus inaequalis* Pander. Druce & Jones, p. 76, pl. 12, figs. 10a-13b, text-fig. 25a.  
 1971 ?*Oistodus lanceolatus* Pander. Druce & Jones, p. 77, 78, pl. 6, figs. 6a-8c, text-fig. 25b.

PLATE 1



- 1971 *Acodus oneotensis* Furnish. Jones, p. 44, pl. 1, figs. 6, 7, pl. 8, figs. 1a-c, non pl. 1, fig. 5.  
 1971 *Oistodus* sp. Ethington & Clark, p. 69, pl. 2, fig. 2.  
 1973 *Acodus oneotensis* Furnish. Müller, p. 26, 27, pl. 7, figs. 1, 3-8.  
 1973 ?*Oistodus lanceolatus* Pander. Müller, p. 40, 41, pl. 8, figs. 3-5.  
 1977 New genus indet. Repetski & Ethington, p. 95, pl. 11, fig. 6.  
 1981 New multielement sp. indet. Ethington, p. 782, text-fig. 3A, B, F-I.  
 1981 New genus a, sp. A Repetski & Perry, p.14-16, pl. 1, figs. 4, 6, pl. 2, figs. 11, 12, 15.  
 1982 New genus a, sp. A Repetski, p. 56, pl. 28, figs. 1-4.  
 1982 New genus 3 Ethington & Clark, p. 118, 119, pl. 13, figs. 21-23, 25, 27.  
 1983 *Rossodus monitouensis* Repetski & Ethington, p. 289-301, figs. 1-3.  
 1983 *Acodus oneotensis* Furnish. An *et al.*, p. 67, pl. 5, figs. 1-8.  
 1986 *Rossodus manitouensis* Repetski & Ethington. Landing *et al.*, p. 1940, pl. 2, figs. 10, 11, 14, 18.  
 1990 *Rossodus manitouensis* Repetski & Ethington. Seo, p 109-112, pl. 2, figs. 8-17, text-figs. 2: 1-4.

**Description.**- Three elements are included in this species.

acontiodiform el.: This simple coniform element bears proclined to erect cusp and a short to long base. The cusp has a rounded carina. The two lateral keels may be deflected posteriorly in many

### Explanation of Plate 1

- Fig.1. *Cordylodus angulatus* Pander, 1856 s.f., lateral view, sample 720, x 60.  
 Figs. 2,3. *Cordylodus cf. rotundatus* Pander, 1856 s.f., lateral views, sample 720, x 80.  
 Fig.4 *Oneotodus variabilis* Lindström, 1954 s.f., lateral view, sample 720, x 80  
 Fig. 5. *Acanthodus* sp., lateral view, sample 720, x 50.  
 Fig. 6. *Chosonodina herfurthi* Müller, 1964 s.f., concave side view, sample 720, x 60.  
 Figs. 7-9. *Rossodus manitouensis* Repetski & Ethington, 1982; 7, drepanodiform el., lateral view, sample 1293, x 90; 8, acontiodiform et., posterior view, sample 720; x 9, drepanodiform el., lateral view, sample 720, x 60.  
 Fig.10,11. *Acanthodus lineatus* (Furnish, 1938) s.f., lateral views, sample 720, x 60 and x 90.  
 Fig. 12. *Acontiodus cf. iowensis* Furnish, 1938 s.f., posterior view, sample 1265, x 90.  
 Fig.13. *Oneotodus variabilis* Lindström, 1954 s.f., postero-lateral view, sample 1299, x 75.  
 Figs.14,15,18 *Teridontus nakamurai* (Nogami, 1980), lateral views, sample 720, x 60.  
 Fig. 16. *Scolopodus warendensis* Druce & Jones, 1971, posterior view, sample 720, x 60.  
 Fig. 17. *Distacodus* sp., lateral view, sample 1300, x 70.  
 Figs.19, 20. *Drepanoistodus pervetus* Nowlan, 1985; 19, subrectiform el., lateral view, sample 1300, x 75; 20, drepanodiform el., lateral view, sample 1300, x 75.  
 Figs. 21,22. *Drepanoistodus* (?) *inaequalis* (Pander, 1856); 21, oistodiform el., lateral view, sample 720, x 75; 22, drepanodiform el., sample 720, x 75.  
 Fig.23. *Scolopodus bolites* Repetski, 1982 s.f., posterior view, sample 1300, x 70.

Table 1. Numerical distribution of conodont species in productive samples from the Dumugol Shale in the Cheungsan-Sabuk area. A, Chamiwon; B, Cheuksan; C, Cheungsan; D, Chikjeon; E, Sabuk.

Location		A		B		C						D			E		Total	
Species	Sample No.	1285	1265	720	1302	1272	1292	1293	1298	1299	1300	1301	1304	1305	1306	1313		1314
<i>Acanthodus lineatus</i>				2														2
<i>Acanthodus</i> sp.				2														2
<i>Acodus</i> sp.								2										2
<i>Acontiodus gracilis</i>						6				4		4						14
<i>Acontiodus</i> cf. <i>iowensis</i>			2							2								4
<i>Acontiodus</i> cf. <i>propinquus</i>									1	9						1	20	31
<i>Acontiodus</i> n. sp.						1												1
<i>Acontiodus</i> sp.		1																1
<i>Chosonodina herfurthi</i>				3														3
<i>Cordylodus angulatus</i>				2														2
<i>Cordylodus</i> cf. <i>rotundatus</i>				1														1
<i>Distacodus</i> n. sp.									3									3
<i>Distacodus</i> sp.										10	1	12				1	7	31
<i>Drepanodus arcuatus</i>														8				8
<i>Drepanodus</i> cf. <i>arcuatus</i>																	1	1
<i>Drepanodus concavus</i>										2							1	3
<i>Drepanodus</i> cf. <i>simplex</i>										1								1
<i>Drepanodus</i> sp.		1				1												2
<i>Drepanoistodus arcuatus</i>										9								9
<i>Drepanoistodus</i> cf. <i>arcuatus</i>										5								5
<i>Drepanoistodus forceps</i>																	12	12
<i>Drepanoistodus</i> ( ? ) <i>inaequalis</i>				5													5	5
<i>Drepanoistodus pervetus</i>					5				4		4							13
<i>Drepanoistodus</i> sp.							1	1		5	17		3		1			28
<i>Oistodus lanceolatus</i>						1												1
<i>Oistodus</i> sp.								1										1
<i>Oneotodus gracilis</i>										10							2	12
<i>Oneotodus variabilis</i>				3		3				3							4	13
<i>Paltodus inconstans</i>			1							5	17							23
<i>Rossodus manitouensis</i>				2				3	4	5	5							19
<i>Scandodus furnishi</i>										1								1
<i>Scandodus</i> cf. <i>furnishi</i>						1				1	6							8
<i>Scandodus rectus</i>						2				31								33
<i>Scandodus</i> sp.																	1	1
<i>Scolopodus basslerii</i>						2							7	9				18
<i>Scolopodus bolites</i>											2							2
<i>Scolopodus filiosus</i>					4			1				5	1	1			1	13
<i>Scolopodus quadruplicatus</i>						1									1			2
<i>Scolopodus warendensis</i>											2							2
<i>Scolopodus</i> sp.						119				99			2			52	592	864
<i>Teridontus nakamurai</i>				5														5

specimens and projected basally as short processes that are equally developed. The elements make a transition series in which asymmetrical to symmetrical forms exist. The cusp tapers gradually above the basal region and gently proclined at the level of the apex of the basal cavity. Posterior side of the cusp bears a prominent median edge that is continued basally as a very short, tongue-like

bulge in the basal margin. The basal margin show an arched outline in posterior view.

drepanodiform el.: Unit is simple coniform with a reclined and laterally asymmetrical cusp, of which curvature is the greatest just above base, so that major portion of the cusp is nearly straight. The posterior and anterior sharp keels are continued to the basal margin and deflected toward inner side. In inner face, a prominent carina is developed from apex of the cone to basal margin, while outer lateral side bears smoothly rounded face. The extension of the upper margin of base makes about an angle of 110 degrees with the axis of the cusp. The basal stretch of the anterior edge is straight, makes about an angle of 60-70 degrees to lower margin that is nearly straight in lateral view. Inner lip of the base is swelled at the portion in which lateral carina meets with lower margin. The basal cavity is deep and its tip exists at medial portion of the cusp, beneath the level of the base of the unit.

oistodiform el. : The unit is a geniculate coniform. It has a deflected, blade-like cusp which bears sharp anterior and posterior keels and a narrow costa that runs approximately along the midline and expands basally across the basal region near the posterobasal angle of inner side. Outer lateral side of the cusp is broadly rounded or may bear a rounded carina along the midportion of the cusp. The anterior edge is straight or may be slightly curved at the base. Outline of lower margin is elliptical, but inflated anteriorly.

**Remarks.**-- *R. manitouensis* is similar to the genus *Juanognathus* in general form, but the form is different from the latter in following characteristics (Repetski & Ethington, 1983); 1) *R. manitouensis* commonly has an anterior carina, 2) the lateral costae of *R. manitouensis* are flat or gently curved posteriorly, 3) the posterior carina of *J. variabilis* commonly possesses one or two shallow longitudinal grooves, and 4) *R. manitouensis* includes oistodiform element in the apparatus but *Juanognathus* does not have this element. *R. manitouensis* was reported as *Acodus oneotensis* Furnish s.f. by Müller (1964) from South Korea, by Druce & Jones (1971), by Jones (1971) from Australia, and by An *et al.* (1983) from North China.

**Regional occurrence.**-- *R. manitouensis* was reported by Repetski & Ethington (1983) from the west-central Utah (Ethington & Clark, 1981 = New genus 3), from the western Texas (Repetski, 1982 = New genus A), from the northern Utah and south eastern Idaho (Landing, 1981 = *Triangulodus?* n. sp.), from the Quebec, Canada (Landing, 1986), from South Korea (Müller, 1964), from Australia (Druce & Jones, 1971; Jones, 1971), and from China (An *et al.*, 1982).

**Range.** -- *Chosonodina herfurthi*-*Rossodus manitouensis* Zone.

**Number of specimens.** - - acontiodiform el., 7; drepanodiform el., 5; oistodiform el., 4.

江原道 旌善郡 甑山-舍北 지역에 분포하는 斗務洞세일  
(하부 오오도비스系) 하부의 코노돈트 化石群

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## 要 約

白雲山向斜 北翼에 해당하는 江原道 旌善 남부지역의 斗務洞세일 하부에 대한 코노돈트 生層序 연구결과를 보고한다. 이 지역 同層 하부에서 산출된 前期 오오도비스系 코노돈트 化石群은 대다수의 圓錐型 코노돈트와, 소량의 빗살형 코노돈트로 구성되어 있다. 이 화석군에 의해 同層 하부에서 *Chosonodina herfurthi*-*Rossodus manitouensis*帶와 *Scolpodus quadraplicatus*帶 등 2개 生層序帶가 인지되었다. 이들은 백운산향사 남익의 同生層序帶와 잘 일치하며, 北美, 北中美, 濠洲 및 北유럽등의 前期 오오도비스系와의 對比가 가능하다.

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