(probably as a result of postmortem processes) or imperfectly preserved. Their specific determination is therefore impossible.

The largest number of isolated findings represent scales and spines. Only the ventral spines may be distinguished among isolated spines on the basis of morphology. The pectoral fin spines are recognizable only when they are associated with the pectoral girdle. The great number of isolated spines allowed more detailed investigation of their inner structure on the basis of natural sections, especially the cross sections. The graph in Fig. 34 shows the dependence of the maximum spine width on the spine length. No differences between *Acanthodes fritschi* n. sp. and *Acanthodes* sp. are visible in this point. No significant differences among this material and spines of some other species of *Acanthodes* were observed. The largest spine found so far is the poorly preserved specimen M 3646 (Ploužnice Horizon) of estimated length about 71 mm. The outer spine morphology was described above under *Acanthodes fritschi* n. sp. Specimens YA 2374 (Fig. 57) and YA 2383 (Fig. 58) show a readily visible posterior groove which is deeper in the second specimen. The posterior groove can be deep with a U-shaped cross section or, by contrast, shallow to imperceptible. Pores of various size are situated in the groove. They are circular and irregularly placed. The inner canal system leads into these pores. The fin web was probably fixed to the fin spine along the anterior rib (further rows of oval pores are placed in the grooves between the anterior rib and the body of the spine). All pores doubtless served for innervation of and circulation within the fin web which thus was not limited to its base in this respect.

The inner structure of spines was already described by ZAJÍC (1985b; p. 282, Fig. 5). The "pith" cavity (main longitudinal canal) is circular in cross-section. Its proximal region opens into the posterior margin of the spine and forms a consequently deep and open "pith" groove with U-shaped cross section. The "pith" groove closes distally and successively shifts from the posterior to the anterior region of the spine body (its diameter simultaneously decreasing up to the spiny tip). The "pith" cavity is missing in the distal one fifth to one sixth of the spine. This structure therefore cannot be limited only to that part of the spine which was inserted between the myomeres as mentioned by WATSON (1937). An indicator of the depth of insertion could be the length of the "pith" groove. The canal system is present beside the "pith" cavity. HEYLER (1969a, b) was the first to describe the canal system as cavities which are separated one another by the flat septa and not as set of tube-shaped canals. ZAJÍC (1985b) described four zones of canals which it is possible to differentiate on the longitudinal section (Figs. 59 and 60). Zone a is represented by compact bone without canals in the anterior rib. Zone b is represented by a comparatively regularly arranged system of canals oblique to both longitudinal axis and spine surface. This zone communicates with the anterior groove by a row of pores. Zone c is mostly occupied by "pith" cavity which is circular or oval in cross-section. Zone d is represented by irregular anastomosing and moderately undulated canals (roughly parallel with the longitudinal spine axis). This zone gradually broadens from the posterior spine margin onward on the whole distal part of the spine. Another zone (e) was recognized during the recent investigation (Fig. 60) but its characteristics are not explicit (Fig. 61). The pattern of communication between inner canals and outer surroundings by means of pores is readily visible in Figs. 62, 67–70, and 73–74 and in Pls. 21D, E. The relationship of the changes of inner structure on the distance from both spine terminations is well shown on the spine cross-sections. The deep "pith" groove closes distally and forms the large "pith" cavity. The "pith" cavity successively diminishes (in the distal termination, it is entirely absent) and the spine flattens in the distal direction (Figs. 63–77).

The only one fragment of caudal fin of a small specimen was found (Fig. 78; Pl. 22C). Scales of adjacent part of the trunk are poorly preserved and determination of this specimen as *Acanthodes fritschi* n. sp. is therefore not possible.

Scales of specimens which are named here as *Acanthodes* sp. have crowns with poorly expressed posterior projections (Pls. 22E-G) or without them. These projections were, however, most probably originally present and their very delicate structure could be lost in various ways. Well preserved specimens of *Acanthodes fritschi* n. sp. show fewer complete preserved scales.

Ontogeny: The bone association of a young specimen (mandibular bone, articular, circumorbital bone, and pectoral girdle) is shown in Fig. 56 and Pl. 19F. The articular is short and the mentomandibular is not preserved. The sculpture of the circumorbital bone consists mostly of fine striae. The suprascapula is already developed in specimens of this size.

Stratigraphic occurrence: Stephanian B (Jelenice-Kounov Members)-Stephanian C (Zdětín, Klobuky, Ploužnice, and Štěpanice-Čikvásky Horizons).

Geographic occurrence: Czech Republic, Bohemia; Plzeň, Rakovník, Kladno, Roudnice, Mšeno, Mnichovo Hradiště, and Krkonoše Piedmont Basins.

Sites: Jedomělice, Klobuky, Kounov, Malesice, Nedvězí, Peruc, Ploužnice, Slaný, Záboř, Žilov, and boreholes Bc-1 (Brodce), Bš-1 (Byšice), Dch-3, 4 (Drchkov), Kbl-2 (Kbel), Ke-5, 7 (Kralovice), Krp-1 (Krpy), Lib-1 (Liběchov), Lo-6 (Lotouš), Mt-1 (Martiněves), MV-1, 2 (Mělnické Vtelno), Nb-5 (Neprobylice), Ob-5 (Otruby), Ři-22, 25, 26, 30 (Řisuty), Sa-2a, 21 (Slaný), Sč-1 (Semčice), Sš-1 (Sušno).

## 3. Taxonomy

### 3.1. Classification of Acanthodii

The following classification is based on that of ZIDEK (1993) and was first used by the author (ZAJÍC 1995):

Class Acanthodii OWEN, 1846

Order Ischnacanthiformes WOODWARD, 1891

Family Ischnacanthidae WOODWARD, 1891

Order Climatiiformes BERG, 1940

Suborder Climatioidei MILES, 1966

Family Climatiidae BERG, 1940

Family Euthacanthidae BERG, 1940

Suborder Diplacanthoidei MILES, 1966

Family Diplacanthidae WOODWARD,1891

Family Culmacanthidae LONG, 1983

Family Gyracanthidae WOODWARD, 1906

Order Acanthodiformes BERG, 1940

Family Mesacanthidae MOY-THOMAS, 1939

Family Cheiracanthidae BERG, 1940

Family Howittacanthidae ZAJÍC, 1995

Family Acanthodidae HUXLEY, 1861

*Acanthodopsis* inc. sedis

## 3.2. Order Acanthodiformes

The diagnosis of the order Acanthodiformes was composed by MILES (1966). Some features (such as the loss of intermediate spines in the Cheiracanthidae, Howittacanthidae, Acanthodidae, Culmacanthidae, Gyracanthidae, and some representatives of the Ischnacanthidae) were recognized as convergent within the class Acanthodii (LONG 1986a). The order Acanthodiformes is, however, considered to be monophyletic. The genus *Acanthodopsis* is assigned by LONG (1986a) as belonging to the family Acanthodidae because the palatoquadrate consists of three coossified segments and because the otic and the auxiliary otic condylae are present on the metapterygoid. If representatives of the genus *Acanthodopsis* are included within the order Acanthodiformes the diagnosis of the order should be modified to include the presence of teeth. However, *Acanthodopsis* is still imperfectly known. Figure 79 shows the emended table from ZAJÍC (1995, Fig. 1).

### 3.2.1. Family Mesacanthidae MOY-THOMAS, 1939

For diagnosis see MILES (1966).

Genus *Mesacanthus* TRAQUAIR, 1888

Stratigraphic range: Pragian–Givetian.
Species:
1. *Mesacanthus mitcheli* (EGERTON, 1861)
   Lochkovian; Scotland; length up to 65 mm; see YOUNG (1995).
2. *Mesacanthus peachi* (EGERTON, 1861)
   Lower Givetian; Scotland; length up to 60 mm.
3. *Mesacanthus pusillus* (AGASSIZ, 1844)
   Eifelian–Givetian; Scotland.
4. *Mesacanthus semistriatus* (WOODWARD, 1892)
   Upper Emsian or Lower Eifelian; Canada (Quebec); length up to 150 mm.
5. *Mesacanthus* sp.
   Upper Eifelian; Scotland.

Genus *Triazeugacanthus* MILES, 1966

Note: Specimens of *Scaumenella mesacanthi* are the remains of *Triazeugacanthus affinis* that have undergone a degradation during fossilization, named as scaumenellization (BÉLAND & ARSENAULT 1985).

Stratigraphic range: Frasnian.
Species:
1. *Triazeugacanthus affinis* (WHITEAVES, 1883)
   Frasnian; Canada (Quebec); length up to 40 mm.

Genus *Lodeacanthus* UPENIECE, 1996

Stratigraphic range: Lower Frasnian.
Species:
1. *Lodeacanthus gaujicus* UPENIECE, 1996
   Lower Frasnian; Latvia; measured lengths are 13–39 mm; see UPENIECE (1996).

### 3.2.2. Family Cheiracanthidae BERG, 1940

For diagnosis see MILES (1966).

Genus *Cheiracanthus* AGASSIZ, 1835

Stratigraphic range: Upper Emsian–Givetian.
Species:
1. *Cheiracanthus murchisoni* AGASSIZ, 1835
   Eifelian–Givetian; Scotland, Orkney Islands; length up to 300 mm.
2. *Cheiracanthus brevicostatus* GROSS, 1973
   Upper Emsian–Givetian; Baltic region, Russia (Central region, Severnaya Zemlya, Kolyma region); scales only.
3. *Cheiracanthus ?costellatus* TRAQUAIR, 1893
   Upper Emsian or Lower Eifelian; Canada (Quebec).
4. *Cheiracanthus grandispinus* MCCOY, 1848
   Middle Devonian; Orkney Islands.
5. *Cheiracanthus latus* EGERTON, 1861
   Eifelian–Givetian; Scotland; length up to 190 mm.
6. *Cheiracanthus longicostatus* GROSS, 1973
   Upper Emsian–Givetian; Baltic region, Russia (Central region, Timan-Pechora region, Severnaya Zemlya, Kolyma region); scales only.
7. *Cheiracanthus splendens* GROSS, 1973
   Eifelian; Baltic region; scales only.
8. *Cheiracanthus crassus* VALIUKEVIČIUS, 1985
   Lower–Middle Eifelian; Baltic region; scales only.
9. *Cheiracanthus intricatus* VALIUKEVIČIUS, 1985
   Eifelian–Givetian; Baltic region; scales only.

| | | Mesacanthidae | Cheiracanthidae | Howittacanthidae | Acanthodidae |
|---|---|---|---|---|---|
| Intermediate spines | | 1 pair | no | no | no |
| Spines insertion in the musculature | | superficial | deep | deep | deep |
| Pelvic or ventral spines | Presence | paired | paired | paired | unpaired or none |
| | Position | around middle or closer to anal spine | different | close to anal spine | close to pectoral spine or around middle |
| | Length | short or medium | medium or long | medium | short or none |
| Gill chamber | | short and deep | short and deep | short | elongated |
| Branchiostegals | | strong | strong | weak | weak |
| Dorsolateral sensory lines | | absent | present | present | absent |
| Scales | | smooth | smooth or ornamented | smooth | smooth |
| Mandibular bone | | present | present or absent | present | present |
| *Acanthodes*-like jaws (LONG 1986) | | absent | absent | present | present |

Fig. 79. The families of the order Acanthodiformes and comparison of their main features (emended after ZAJIC 1995, Fig. 1).

| Age | | Mesacanthidae | Cheiracanthidae | Howittacanthidae | Acanthodidae |
|---|---|---|---|---|---|
| Permian | Saxonian | | | | |
| | Autunian | | | | |
| Carboniferous | Stephanian | | | | |
| | Westphalian | | | | |
| | Namurian | | | | |
| | Viséan | | | | |
| | Tournaisian | | | | |
| Devonian | Famennian | | | | |
| | Frasnian | | | | |
| | Givetian | | | | |
| | Eifelian | | | | |
| | Emsian | | | | ? |
| | Pragian | | | | |
| | Lochkovian | | | | |

Fig. 80. The families of the order Acanthodiformes and their stratigraphic range.

10. *Cheiracanthus talimae* VALIUKEVIČIUS, 1985
Eifelian–Givetian; Baltic region, Central Russia; scale only.
11. *Cheiracanthus gibbosus* VALIUKEVIČIUS & KARATAJUTE-TALIMAA, 1986
Upper Emsian–Lower Eifelian; Baltic region; scales only.
12. *Cheiracanthus krucheki* VALIUKEVIČIUS & KARATAJUTE-TALIMAA, 1986
Upper Emsian; Baltic region; scales only.

Genus *Homalacanthus* RUSSEL, 1951

Stratigraphic range: Frasnian–Tournaisian.

Species:
1. *Homalacanthus concinnus* (WHITEAVES, 1887)
Frasnian; Canada (Quebec); length up to 290 mm.
2. *Homalacanthus bergi* (OBRUCHEV, 1962)
Tournaisian; Russia (Siberia, Tuva Basin); length up to 150 mm.

Genus *Protogonacanthus* MILES, 1966

Stratigraphic range: Lower Frasnian.
Species:
1. *Protogonacanthus juergeni* MILES, 1966
Lower Frasnian; Germany (Rhineland); length up to 90 mm.

Genus *Carycinacanthus* MILES, 1966

Stratigraphic range: Tournaisian.
Species:
1. *Carycinacanthus lopatini* (ROHON, 1889)
   Tournaisian; Russia (Siberia, Minusinsk and Tuva Basins); length up to 110 mm.

Genus *Markacanthus* VALIUKEVIČIUS, 1985

Diagnosis is based on histology and morphology of scales (VALIUKEVIČIUS 1985).
Stratigraphic range: Middle Emsian–Givetian.
Species:
1. *Markacanthus costulatus* VALIUKEVIČIUS, 1985
   Eifelian–Givetian; Baltic region, Central Russia; scales only.
2. *Markacanthus parallelus* VALIUKEVIČIUS & KARATAJUTE-TALIMAA, 1986
   Emsian; Baltic region; scales only.
3. *Markacanthus alius* VALIUKEVIČIUS, 1988
   Givetian; Baltic region; scales only.

Genus *Isodendracanthus* VALIUKEVIČIUS, 1979

Diagnosis is based on histology and morphology of scales (VALIUKEVIČIUS 1979).
Stratigraphic range: Eifelian.
Species:
1. *Isodendracanthus ramiformis* VALIUKEVIČIUS, 1979
   Eifelian; Spitsbergen; scales only.

Genus *Ectopacanthus* VALIUKEVIČIUS, 1979

Diagnosis is based on histology and morphology of scales (VALIUKEVIČIUS 1979).
Stratigraphic range: Upper Lochkovian–Eifelian
Species:
1. *Ectopacanthus cristiformis* VALIUKEVIČIUS, 1979
   Eifelian; Spitsbergen; scales only.
2. *Ectopacanthus flabellatus* VALIUKEVIČIUS & KARATAJUTE-TALIMAA, 1986
   Middle Emsian–Lower Eifelian; Baltic region; scales only.
3. *Ectopacanthus* sp. no. 1
   Upper Lochkovian; Baltic region, Ukraine (Podolia); scales only, this species will be described by VALIUKEVIČIUS.

### 3.2.3. Family Howittacanthidae ZAJÍC, 1995

For diagnosis see ZAJÍC (1995).

Genus *Howittacanthus* LONG, 1986

Stratigraphic range: Frasnian.
Species:
1. *Howittacanthus kentoni* LONG, 1986
   Frasnian; Australia (Victoria); length up to 250 mm (after LONG 1986b) or up to 400 mm (after ZIDEK 1988).

### 3.2.4. Family Acanthodidae HUXLEY, 1861

For diagnosis see ZAJÍC (1995). *Pseudacanthodes* is probably a synonym of *Traquairichthys* (ZIDEK, oral communication). Presence of an unpaired ventral spine is presumed in *Utahacanthus* in spite of the holotype (the only known specimen) providing no evidence.

Genus *Acanthodes* AGASSIZ, 1833

Diagnosis (based on DENISON 1979; modified): Acanthodians with long, slender body; endocranium is perichondrally ossified as one paired and 3 or 4 median bones; palatoquadrate has 3 ossifications and palato-basal and double otic articulations with the endocranium; Meckelian cartilage has 2 ossifications and double mandibular joint; mandibular bone is present; head may be covered with thin polygonal platelets (tesserae) which are often reduced or lost except for scales along the sensory lines; 4 or 5 circumorbital bones are present; gill region is long; branchiostegal rays support at least the anterior part of the gill covers; shoulder girdle has suprascapular, scapulocoracoid, and procoracoid ossifications; fin spines are long, slender, slightly curved, deeply inserted, and ornamented with a rounded rib anteriorly and a groove on each side; dorsal fin spine is far posterior to the anal one; both being of equal length or the anal being slightly longer; pectoral fin spines are very long; unpaired ventral spine is small and mostly anterior in position; tail has a strongly upturned main lobe and large hypochordal lobe; scales are small and smooth.

Note: Presence of an unpaired ventral spine (the term erected HEIDTKE 1990a) is a significant generic feature of *Acanthodes* (see ZAJÍC 1995; p. 167).

Stratigraphic range: Middle Lochkovian, Tournaisian-Autunian, ?Saxonian (or Artinskian, ?Kungurian).
Species:
1. *Acanthodes bronni* AGASSIZ, 1833
   (= *Acanthoëssus* AGASSIZ, 1832 – nomen nudum; = *Acanthodes rouvillei* SAUVAGE, 1883) Autunian; Germany (Saar-Nahe Basin); described is length 19,5–750 mm but some longer specimens were recently found (undescribed; HEIDTKE – oral communication).
2. *Acanthodes bourbonensis* HEIDTKE, 1996
   Autunian; France (Massif Central); length up to 200 mm (holotype only); most of other specimens of the same provenance which were described by HEYLER (1960, 1969a, 1969b, 1977, 1984, 1987), HEYLER & POPLIN (1990), and LANGIAUX & SOTTY (1977) probably also belong to this species.
3. *Acanthodes boyi* HEIDTKE, 1993
   Autunian; Germany (Saar-Nahe Basin); length 440 mm (holotype only); see HEIDTKE (1993).
4. *Acanthodes bridgei* ZIDEK, 1976
   Stephanian B (?); USA (Kansas); length 54–410 mm.

5. *Acanthodes fritschi* n. sp.
   Stephanian B–C; Czech Republic (Bohemia); estimated length up to 350 mm.
6. *Acanthodes gracilis* (BEYRICH, 1848)
   Autunian; Poland, Czech Republic (Bohemia, Moravia), Germany (Saale Basin).
7. *Acanthodes guizhouensis* WANG SHITAO & TURNER, 1985
   Tournaisian; China (Guizhou province); scales only (taxonomic classification is therefore uncertain).
8. *Acanthodes kinneyi* ZIDEK, 1992
   Stephanian B; USA (New Mexico); length more than 330 mm.
9. *Acanthodes luedersensis* (DALQUEST, KOCURKO & GRIMES, 1988)
   Lower Permian (?Autunian), marine; USA (Texas); estimated length 500–844 mm; scales, spines, scapulocoracoids, and circumorbitals only.
10. *Acanthodes lundi* ZIDEK, 1980
    Namurian C; USA (Montana); length 55–400 mm.
11. *Acanthodes nitidus* WOODWARD, 1891
    Lower Visean; Scotland.
12. *Acanthodes ovensi* WHITE, 1927
    Tournaisian; Scotland; length up to 90 mm (FOREY & YOUNG, 1985a) or up to 400 mm (ZIDEK, 1988).
13. *Acanthodes sippeli* HEIDTKE, 1995
    Namurian B; Germany (Westphalia); known length 350–420 mm.
14. *Acanthodes sulcatus* AGASSIZ, 1835
    Visean; Scotland; relevance to the genus is uncertain (ZIDEK 1980; LONG 1986a, 1986b).
15. *Acanthodes tholeyi* HEIDTKE, 1990
    Autunian; Germany (Saar-Nahe Basin); estimated length is 350 mm (holotype only); see HEIDTKE (1990b).
16. *Acanthodes wardi* EGERTON,1866
    (probably = *Acanthodes major* DAVIS, 1894; = *Acanthodes striatus* WELLBURN, 1901) Westphalian; England, Scotland; length up to 250 mm or up to 750 mm (*A. major*).

Imperfectly preserved and therefore so far indeterminable findings:

1. *Acanthodes* sp.
   (= *Acanthodes latgalica* LYARSKAJA & LUKŠEVIČ, 1992)
   Emsian; Baltic region; fin spines only.
2. *Acanthodes* sp.
   (= *Acanthodes australis* WOODWARD, 1906)
   Tournaisian; Australia; length up to 300 mm; indeterminable (LONG 1986b, p. 1).
3. *Acanthodes* sp.
   (= *Acanthodes beecheri* EASTMAN, 1902; = *Acanthodes marshi* EASTMAN, 1902)
   Westphalian D; USA (Illinois); indeterminable (ZIDEK 1976).
4. *Acanthodes* sp.
   (= *Acanthodes punctatus* FRITSCH, 1893; partim)
   Stephanian B; Czech Republic (Bohemia); indeterminable (ZAJÍC 1988c).

Indeterminable or undescribed findings:

1. *Acanthodes* sp.
   Tournaisian; Canada (Nova Scotia); see ZIDEK (1977).
2. *Acanthodes* sp.
   Visean; South Africa; see DENISON (1979).
3. *Acanthodes* sp.
   Namurian A; the Netherlands; skin fragment, see VAN der HEIDE (1943).
4. *Acanthodes* sp.
   Namurian; USA (Iowa); scales of the subtype 091, see TWAY & ZIDEK (1982).
5. *Acanthodes* sp.
   Westphalian A; France (North French Basin); skin fragment, see PRUVOST (1919).
6. *Acanthodes* sp.
   Westphalian C; USA (Indiana); see DENISON (1979).
7. *Acanthodes* sp.
   (= *Acanthodes* cf. *A. marshi*)
   Westphalian D–Autunian; USA (Pennsylvania, Ohio, West Virginia); probably inhomogeneous material of different species, see LUND (1976).
8. *Acanthodes* sp.
   Stephanian A–C; Germany (Saar-Nahe Basin); see GERMER & ENGEL (1986) and BOY & MARTENS (1991).
9. *Acanthodes* sp.
   Stephanian B (?); USA (Kansas); an juvenile specimen, see ZIDEK (1976).
10. *Acanthodes* sp.
    Stephanian B–C; Czech Republic (Bohemia); indeterminable specimens described in this paper.
11. *Acanthodes* sp.
    Stephanian B or C, euryhaline; USA (Kansas); see FOREMAN & MARTIN (1988), CHORN & SCHULTZE (1990), and TWAY (1979) – scales of the subtype 091.
12. *Acanthodes* sp.
    Stephanian B–C; Spain (Puertollano Basin); see FOREY & YOUNG (1985b).
13. *Acanthodes* sp.
    Stephanian B/C; France (Massif Central); see HEYLER (1969b, 1977, 1980), HEYLER & POPLIN (1994), and LANGIAUX & SOTTY (1977).
14. *Acanthodes* sp.
    (= *Acanthodes* cf. *A. bronni*)
    Stephanian C; Germany (Saale Basin); see HAUBOLD & KATZUNG (1983), SCHNEIDER (1987), and SCHNEIDER, SIEGESMUND & GEBHARDT (1984).
15. *Acanthodes* sp.
    (= *Acanthodes gracilis*)
    Stephanian C–Autunian; Germany (Saale Basin); see HAUBOLD & KATZUNG (1983), and SCHNEIDER (1987).
16. *Acanthodes* sp.
    Upper Carboniferous or Lower Permian; East Greenland; see JENSEN (1975), and SIMPSON (1973).
17. *Acanthodes* sp.
    Autunian; USA (New Mexico); see VAUGHN (1969).

18. *Acanthodes* sp.
    Autunian; USA (Oklahoma,Texas); see VAUGHN (1969).
19. *Acanthodes* sp.
    Autunian; USA (Kansas); see FOREMAN & MARTIN (1988).
20. *Acanthodes* sp.
    Autunian; France (Massif Central); one specimen from the Lodeve Basin, see HEYLER (1977).
21. *Acanthodes* sp.
    Lower Permian (Autunian–?Saxonian); Germany (Saar-Nahe Basin); BOY (1987) mentioned these remains from the Nahe Group N3 and N4. The Members N4 and N5 are correlated with Leonardian (USA) or Kungurian (according to ZIDEK 1993). In this case, these remains could be the youngest known acanthodians of all.

Devonian marine isolated scales with *Acanthodes*-like morphology and/or histology:

1. *?Acanthodes* sp.
   (= *Acanthodes ?dublinensis* STAUFFER, 1883)
   Devonian; Canada (Emsian of Bathurst and Ellesmere Islands), USA (Middle Devonian of Ohio, Indiana and Upper Devonian of Iowa), Belgium (Middle Devonian); GROSS (1973; p. 66) mentioned that the correspondence of these isolated scales with the Permo-Carboniferous genus *Acanthodes* is only slightly probable because unornamented scales originated repeatedly in acanthodians during phylogeny, see DENISON (1979), DERYCKE, CLOUTIER & CANDILIER (1995); VIETH (1980).
2. *?Acanthodes* sp.
   Upper Lochkovian–Upper Eifelian; Russia (Severnaya Zemlya, Taimyr); see VALIUKEVIČIUS (1988).
3. *?Acanthodes* sp.
   Upper Famenian; Belgium; see DERYCKE & CHANCOGNE-WEBER (1995)
4. *?Acanthodes* sp. *A*
   Middle Eifelian–Frasnian; Baltic region, Russia (Central region, Timan-Pechora); see VALIUKEVIČIUS (1985, 1988).
5. *?Acanthodes* sp. *B*
   Upper Emsian-Frasnian; Baltic region, Russia (Central region, Timan-Pechora, Severnaya Zemlya), Spitsbergen; see VALIUKEVIČIUS (1985, 1988).
6. *?Acanthodes* sp. *C*
   Middle Lochkovian–Lower Eifelian; Baltic region, Russia (Central region, Timan-Pechora, Taimyr, Severnaya Zemlya, Kolyma); see VALIUKEVIČIUS (1985, 1988).
7. *?Acanthodes* sp. *D*
   Upper Emsian–Frasnian; Baltic region, Central Russia; see VALIUKEVIČIUS (1985, 1988).
8. *?Acanthodes* sp. *E*
   Lochkovian; Russia (Taimyr); see VALIUKEVIČIUS (1995).

Genus *Traquairichthys* WHITLEY, 1933

Notes: ZIDEK (1973) mentioned scales and undescribed specimens of this genus from the Kounov Member of the Central Bohemian Basins (Stephanian B) in the collection of the National Museum, Prague. I found some specimens of *Traquairichthys pygmaeus* labelled as derived from the localities of Kounov Member. The sediment and preservation of these specimens is, however, identical with sediment of the Nýřany Member (Westphalian D; localities Nýřany or Třemošná) and is quite different from the labelled localities. The localization on the labels is therefore mistaken. The author's name must be changed from (FRITSCH, 1875) into (FRIČ, 1875) according to the original paper.

Stratigraphic range: Westphalian–?Autunian.

Species:

1. *Traquairichthys pygmaeus* (FRIČ, 1875)
   Westphalian D; Czech Republic (Bohemia); length around 100 mm (JENSEN 1975).
2. *Traquairichthys* sp.
   ?Westphalian; Eastern Greenland; length less than 100 mm, see JENSEN (1975).
3. *Traquairichthys* sp.
   Stephanian or Autunian; USA (Texas); length 37 mm (ZIDEK 1973), see also DUNKLE & MAMAY (1956).

Genus *Pseudacanthodes* WHITE & MOY-THOMAS, 1941

Note: Some features described by FRITSCH (1893) seem to be questionable (JENSEN 1975; DENISON 1979, ZIDEK – oral communication) and specimens of *Pseudacanthodes pinnatus* may represent somewhat differently preserved *Traquairichthys pygmaeus*.

Stratigraphic range: Westphalian D.

Species:

1. *Pseudacanthodes pinnatus* (FRITSCH, 1893)
   Westphalian D; Czech Republic (Bohemia); length around 60 mm.

Genus *Utahacanthus* SCHULTZE, 1990

Stratigraphic range: Namurian B.

Species:

1. *Utahacanthus guntheri* SCHULTZE, 1990
   Namurian B; USA (Utah); length up to 60 mm.

Genus *Acanthodopsis* HANCOCK & ATTHEY, 1868

Note: The taxonomic position of this genus is not clear (see MILES 1966; ØRVIG 1973; LONG 1986a; ZIDEK 1993). I prefer the classify this genus as incertae sedis pending a description of some better preserved specimens.

Stratigraphic range: Westphalian.

Species:

1. *Acanthodopsis wardi* HANCOCK & ATTHEY, 1868
   Westphalian B; England, Scotland; length up to 750 mm.
2. *Acanthodopsis microdon* TRAQUAIR, 1894
   Westphalian; England.