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Fifty-year history of Early/Lower Vertebrates symposia – An overview

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ABSTRACT:

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Fourteen symposia on early/lower vertebrates have taken place over the last 50 years, usually at about four year intervals. An average 60 participants have taken part at these symposia, with over one hundred occasionally. The results of the symposia have been published in proceedings. The symposia started honoring E. A:son Stensiö and E. Jarvik. Honors were taken up at the 11th symposium in Uppsala again. Since the 13th symposium a Stensiö award is also given to young researchers in the field.

Key words: Vertebrates; Paleozoic; Meetings; Proceedings; Honors.

INTRODUCTION

The series of symposia dedicated to the study of early/lower vertebrates, especially to fishes of the Paleozoic has its informal beginning with the Fourth Nobel Symposium in 1967. The first three symposia were organized as single events, thereafter the symposia were recognized as a series assembling scientists studying Paleozoic vertebrates.

In 1967, the Fourth Nobel Symposium in Stockholm brought together scientists worldwide working on lower vertebrates, mainly on Paleozoic fossils and extant forms, especially their ontogeny. That was followed in 1972 by the Symposium on Interrelationships of Fishes organized by The Linnean Society, with emphasis on the gnathostome crown group, focusing on fossil fishes with extant relatives. A third symposium in 1976, The First International Colloquium on Middle Palaeozoic Fishes in Tallinn, Estonia (at that time part of USSR), with scientists from the East and West, concentrated on Paleozoic fishes and their stratigraphic distribution, which proved to be a landmark for future international meetings on early/lower vertebrates in the Paleozoic. At this meeting, it was suggested to have meetings of scientists working on Paleozoic vertebrates more frequently, such as every four years. Nevertheless, the next symposium was held seven years later in Australia. Afterwards the symposia followed a more regular sequence.

We recognize the symposia in 1967, 1972 and 1976 as the first three of the series on early/lower vertebrates (Schultze 2005). The symposium in Chęciny, Holy Cross Mountains, Poland in 2017 was the 14th in the sequence in 50 years, which is nearly a four year interval (exactly 3.8 years).

The goal of this contribution is to document the emphasis of each symposium on early/lower vertebrates, the proceedings that resulted from these initiatives, and the honored scientists, as well as the Stensiö awards to young scientists.

SEQUENCE OF THE SYMPOSIA ON EARLY/LOWER VERTEBRATES (Table 1)[1]

The Fourth Nobel Symposium – Current Problems of Lower Vertebrate Phylogeny – at the Naturhistoriska Riksmuseet in Stockholm in 1967 was organized by the Nobel Foundation. It was the final act to honor the "Stockholm School" also called

[1] For a detailed description of the first 10 symposia and pictures of participants see Schultze (2005).

Year	Place	Three countries with a largest contingent	Number of participants
1967	Stockholm, Sweden	13 Sweden, 8 USA, 7 Great Britain	47
1972	London, UK	43 Great Britain, 4 Sweden, 4 Denmark	59
1976	Tallinn, USSR	15 Russia, 5 Estonia, 4 France	35
1983	Sydney + Canberra	8 Australia, 4 Great Britain, 3 China	22
1987	Fanshan + Mt. Shishan, Yunnan	19 China, 5 USA, 5 Australia	42
Twenty Years of Early/Lower Vertebrate symposia (not considered)			
1989	Tallinn, Estonia	18 Russia, 8 Estonia, 5 Latvia, Great Britain, USA	62
1991	Miguasha, Canada	14 Canada, 10 Great Britain, 8 USA	58
1995	Paris, France	21 France, 11 Great Britain, 9 Russia, 9 USA	103
2000	Flagstaff, USA	37 USA, 10 Great Britain, 8 Australia	82
2004	Gramado, Brazil	7 USA, 5 Brazil, 5 France	34
2007	Uppsala, Sweden	21 USA, 18 Sweden, 18 UK	105
Forty Years of Early/Lower Vertebrate symposia			
2011	Dallas, USA	18 USA, 9 Canada, 3 Sweden and Germany	44
2015	Melbourne, Australia	19 Australia, 9 Great Britain, 9 USA	65
2017	Chęciny, Poland	11 Australia, 10 USA, 8 Sweden	66
Fifty Years of Early/Late Vertebrate symposia			

Table 1. Sequence of Early/Lower Vertebrate symposia with largest contingent of three countries; bold, anniversaries

"Swedish School", which had brought vertebrate paleontology in line with comparative anatomy at the beginning of the 20th century (Patterson 1990, Schultze 2009). Today it is normal for us to consider fossils like living organisms and reconstruct soft structures with hard anatomical ones and use similar methodologies as those used in extant organisms. That was new at the beginning of the last century. E. Stensiö used the knowledge of comparative anatomy to interpret fossil fishes. He described endocranial features in detail. His use of small scale serial sectioning to build wax models of the brain, nerves and blood vessels were famous. The presentations at the Fourth Nobel Symposium were essentially in the "old" way, with detailed description of morphological structures and comparison of similarities. In many cases opposing interpretations were presented; nevertheless more time was given to the opinion of the "Stockholm School." An exception in the program was the dinner presentation by Lars Brundin on the Hennigian system. Brundin argued that each phylogenetic arrangement and the classification corresponds to one-time level because the Hennigian method is a back-cutting starting at one-time level, therefore a phylogeny/classification starting from the present time level has not to be the same as one starting from another time level.

The second symposium, Symposium on Interrelationships of fishes in London, honored the Swedish researchers E. Stensiö and E. Jarvik again, but with another approach in organizing and presenting the symposium – not looking backwards as the first one, but forwards. The symposium was rigidly organized including the discussion panels. The main emphasis was given to the actinopterygians, fossil and recent.

The third symposium, the I. International Colloquium on Middle Palaeozoic Fishes, was a meeting among paleoichthyologists from the East and West in Tallinn. At that time, the cooperation among colleagues from the East and West was difficult during the Cold War period. No proceedings of the meeting were published, so that the round table discussion on the homologization of skull roofing bones within osteichthyans was not published. M.A. Shishkin (see Shishkin 1973), E. Vorobyeva and H.-P. Schultze defended Westoll's use of parietal and postparietal for all osteichthyans (Westoll 1938, 1943), whereas E. Jarvik, I.M. Medvedeva and N.S. Lebedkina favored the traditional use of frontal instead of parietal in actinopterygians and sarcopterygians. T.S. Westoll took a non-compromising position. Researchers of the East and the West using small fish remains (e.g., scales) also discussed their biostratigraphic use. At that meeting, the idea was forwarded to have more regular meetings among paleoichthyologists working in the Paleozoic. Consequently, a four-year sequence was proposed.

Nevertheless, the next meeting was arranged seven years later in Australia through the initiative of K.S.W. Campbell. The 4th symposium, Evolution & Biogeography of Early Vertebrates, was held in two locations, Sydney and Canberra. Extensive excursions (Text-fig. 1) were offered during the move from

Text-fig. 1. 4th symposium: Upper Devonian Mandagery Sandstone locality near Canowindra, New South Wales, Australia (picture taken by H.-P. Schultze 20.2.1983)

Sydney to Canberra, and after the meeting. Two colleagues from the Soviet Union, E.I. Vorobyeva and E. Mark-Kurik, had permission to attend the meeting, and Chinese colleagues participated for the first time.

The Chinese colleagues – after total isolation behind the Iron Curtain – were the first to open to the western world, so we had the next meeting in China. The 5th symposium, Early Vertebrates and related Problems of Evolutionary Biology, was held again in two locations; the first part in Fangshan near Beijing with cultural excursions around Beijing, and the second in a hotel on Mt. Shishan, Yunnan, with extensive excursions in Yunnan. The rich Devonian fish fauna of Yunnan and their localities (Text-fig. 2) were presented. The rich Chinese Paleozoic fish fauna, the great number of localities and the number of young Chinese researchers attending that symposium brought a completely new aspect to the field of Paleozoic fish research.

Although the symposium took place 20 years after the first, the anniversary was not considered.

The next meeting, the 2nd International Colloquium on Middle Palaeozoic Fishes, in Tallinn, Estonia, was during the period of the demise of the Soviet Union. At that time excursions to localities in Estonia and Latvia, even to the island Saaremaa were possible. The place (Straupe, Latvia, Text-fig. 3) where W. Gross grew up before and during the First World War, was visited; and a special exhibit with Devonian fishes honoring him was presented in the Latvian Nature Museum in Riga, Latvia.

Two years later the group met in Miguasha, Quebec, Canada, the place (old name: Scaumenac Bay; Text-fig. 4A) that Stensiö visited in 1922 and made contact with private collectors who supplied him with specimens over years (for details see Lemieux 1996). E. Jarvik (Text-fig. 4B), who studied one three-dimensional specimen of *Eusthenopteron* from that locality during his whole life (Cloutier 1996; Jarvik 1996), visited the locality for the first time at the 7th symposium, VIIth International Symposium – Studies on Early Vertebrates, in 1991. A new, large museum building with modern lecture facilities was finished for the symposium in Miguasha under the direction of M. Arsenault.

Text-fig. 2. 5th symposium: Middle Devonian locality with rich osteolepid fauna, cement quarry near Shuinichang, Yunnan, China (picture taken by H.-P. Schultze, 19.10.1987)

Text-fig. 3. 6th symposium: Parsonage (Pfarrhaus) Straupe, Latvia, where W. Gross lived during his youth (picture taken by H.-P. Schultze 18.9.1989)

Text-fig. 4. 7th symposium: Escuminac Bay, Miguasha, Quebec, Canada. A – symposium participants below the Upper Devonian sequence, Escuminac Formation. B – E. Jarvik interviewed at the beach (pictures taken by H.-P. Schultze, June 1991)

Thereafter the symposia continued in a four year sequence. The 8th symposium, Premiers Vertébrés et Vertébrés inférieurs, followed in 1995 in Paris with the scope broadened to include Mesozoic fishes. It was the symposium with the largest number of participants at that time.

Contrary to the other symposia, extended abstracts were solicited and published (Text-fig. 7C), but a proceedings volume was not published. The 9th International Meeting on Early Vertebrates/Lower Vertebrates was delayed one year because of the hesitation of the organizer, D. Elliott who could not believe that people would come to Flagstaff, Arizona, to attend the meeting. Nevertheless, it was widely attended. It included a long excursion to Devonian localities in Nevada (Text-fig. 5) and Utah, and Jurassic and Paleogene localities in Colorado and Wyoming. The 9th symposium was followed in 2004 by a relatively small meeting in the nice city of Gramado with a field trip through southern Brazil.

The symposia series returned to Sweden in 2007, but to Uppsala instead of Stockholm. Per Ahlberg had just started a new center of Paleozoic paleoichthyology in Sweden. There were only three years between the meeting in Brazil and the symposium in Sweden. Per Ahlberg arranged the 11th International Symposium on Early and Lower Vertebrates – Forty Years of Early Vertebrates, so that it fell on the 40th anniversary of the Fourth Nobel Symposium in 1967. It was the symposium with the largest number of participants up to now, even surpassing the 1995 symposium in Paris (see Table 1).

At the 12th International Symposium on Early Vertebrates/Lower Vertebrates in Dallas, Texas, the participants suffered under a heat of up of over 46°C (= 115°F) on the field excursion after the meeting. An award for young participants was discussed, and the Stensiö award established to be presented at the next symposium in Australia. Planned for a distant locality in central or northern Australia, the 13th International Symposium on Early and Lower Vertebrates took place in Melbourne, the second largest city in Australia, in 2015. The pre-meeting excursion brought the participants to the famous Upper Devonian locality Gogo in Western Australia (Text-fig. 6). Two proposals for the next meeting were presented. In the four-year cycle, the offer to have the symposium in 2019 in China was accepted. In addition, an intercalation of a symposium in two years by our Polish colleagues was also accepted. With the 14th International Symposium on Early and Lower Vertebrates, we celebrated in Chęciny in the Holy Cross Mountains, Poland, the 50th anniversary of the

Text-fig. 5. 9th symposium: participants of the excursion at the upper Middle Devonian locality Red Hill, Northern Simpson Park Range, northwest of Eureka, Nevada, U.S.A. (Roberts Mountain in the back ground; picture taken by H.-P. Schultze, 23.5.2000)

series. At this symposium, all the participants were accommodated in one location, the European Centre for Geological Education, a new building complex in a former quarry where the oral and poster presentations were delivered.

The three largest symposia in the last 50 years were the 11th in Uppsala, Sweden (105 participants), the 8th in Paris (103 participants), France and the 9th in Flagstaff, Arizona, USA (89 participants). On average 59 participants attended the meetings. The first Australian symposium was the smallest. It was the first of the permanent series and may have been too far for most colleagues at the time. There is no correlation between number of participants and size of the location or access to Paleozoic localities. Looking at the list of participants attending the meetings (Table 1), a reader may realize another fact that the inviting country is represented by most participants in most cases, with the exceptions of Brazil, Sweden 2007, and Poland.

Text-fig. 6. 13th symposium: Pre-meeting excursion at the original Gogo camp site at a Upper Devonian reef complex, Gogo Station, near Fitzroy Crossing, Western Australia (picture taken by H.-P. Schultze 25.8.2015)

The next symposium will be held in Qujing, Yunnan, China in 2019, followed by the 16th symposium in Valencia, Spain.

PROCEEDINGS OF THE SYMPOSIA

The results of the symposia were published in separate books and in established journals in the field (see Table 2; Text-fig. 7). A similar series like that for the Mesozoic Fishes symposia was not established.

The first two symposia (Ørvig 1968 and Greenwood *et al.* 1973) fell during the time when the Hennigian system was introduced into the English-speaking biology community. Rainer Zangerl who translated Hennig's book making it accessible to a larger community of biologists, and Gareth Nelson, who pushed cladistic vehemently, were present at both symposia, but neither one was speaking in favor of it. Lars Brundin, an entomologist of the Naturhistoriska Riksmuseet in Stockholm, presented the subject at the symposium dinner and in the proceedings without any resonance (Brundin 1968). In contrast, Jarvik (1968, p. 522) placed the "traditional, typological (horizontal) arrangement into hierarchic classes" against it. The 1968 volume (Text-fig. 7A) presents for most groups the two contradictory ideas of relationships of the different fish groups in the traditional way selecting few characters in favor of the preferred relationship. An exception were the cyclostomes, where Stensiö's diphyly, which was supported by R. Strahan at the meeting, stands alone.

The proceedings of the second symposium (Text-fig. 7B) present a thematic volume of the interrelationships of crown gnathostomes. To cover all extant groups, authors who were not present at the meeting, were especially invited. In that way, missing subjects like recent chondrichthyans and ostariophysan teleosts were incorporated. Emphasis was given to actinopterygians and within them to teleosts. Patterson (1973) argued that Holostei is paraphyletic, and Rosen (1973) gave a detailed analysis of higher euteleosts with a cladistic phylogeny. These proceedings were considered so important that a second book on *Interrelationships of Fishes* for crown gnathostomes (Stiassny *et al.* 1996) was published about 20 years later, trying to repeat the success of the first one. Most of the papers of the proceedings of the second symposium edited by Greenwood *et al.* (1973) are outside the scope of our series of symposia in contrast to the other proceedings where papers on recent fishes have appeared only sometimes.

The proceedings of the 4th symposium (Campbell *et al.* 1984) included mainly papers on Paleozoic groups like galeaspids and placoderms. Two papers on Devonian dipnoans are of wider interest. Campbell and Barwick (1984) demonstrated that dipnoans have no choana (*contra* Rosen *et al.* 1981), and Chang and Yu (1984) published the strongly discussed basal dipnoan *Diabolepis* (with the preoccupied name *Diabolichthys*), which became a pivotal form in the discussion of the relationship of dipnoans to other sarcopterygians. All papers included cladistic analyses, one paper was concerned with areal cladistics (vicariance biogeography).

Half of the contributions in the proceedings of the 5th symposium (Chang *et al.* 1991) were on Chinese material, placoderms and sarcopterygians. Many (25%) of the papers were on "agnathans." Young (1991) described a new group of "agnathans," the Pituriaspida, a Middle Devonian group with some similarities to osteostracans. They are known from imprints only from western Queensland, Australia. The volume included an outlying paper on the caudal skeleton of teleosts.

E. Mark-Kurik put together a thematic symposium under the title "Fossil Fishes as Living Animals."

	Main content of proceedings	Editors	Year	Pages	No.
1st Symposium	Controversy of relationships with one demonstrating cladistic methodology	Ørvig	1968	539	28
2nd Symposium	Thematic volume (crown gnathostomes) some cladistic mode	Greenwood, Miles and Patterson	1973	xvi + 536	15
3rd Symposium	no proceedings				0
4th Symposium	Emphasis on placoderms, *Diabolepis* as basal dipnoan	Campbell, Ritchie, Warren and Young	1984	326	14
5th Symposium	Chinese material, new group: pituriaspids. Placoderms, few sarcopterygians	Chang, Liu and Zhang	1991	v + 514	21
6th Symposium	Thematic volume (Fossil fishes as living animals)	Mark-Kurik	1992	299	29
7th Symposium	Heavy on placoderms, Romer's gap, and biostratigraphy	Arsenault, Lelièvre and Janvier	1995	529	20
8th Symposium	Biochronology, histology and actinopterygians	Lelièvre, Wenz, Blieck and Cloutier extended abstract	1995	409	69
9th Symposium	Chondrichthyan and actinopterygian braincases	Elliott and Gottfried	2001	183	20
10th Symposium	Review of the first ten symposia	Richter	2005	viii + 73	9
11th Symposium	Two northern researchers, Stockholm school	Ahlberg, Blom and Boisvert	2009	384	29
12th Symposium	Early history of vertebrate paleontology in Texas	Elliott	2012	115	9
13th Symposium	no proceedings				0
14th Symposium	Review of 50 years Early/Lower Vertebrate symposia	Ginter, Łuczyński and Żylińska	2018	224	15

Table 2. Proceedings of Early/Lower Vertebrate symposia. No. – number of contributions in symposium proceedings

Text-fig. 7. Cover of proceedings: A – 1st symposium; B – 2nd symposium; C – 8th symposium; D – 11th symposium

Thus, the papers in the proceedings of the 6th symposium (Mark-Kurik 1992) are arranged under the headings Palaeoecology, Function, Morphology, Ontogeny and Relationships and Environment. The contributions were relatively short, and none dealt with the subject extensively.

M. Arsenault had problems finding a publisher for the proceedings of the 7th symposium (Arsenault *et al.* 1995), therefore the proceedings were published late in the same year as the extended abstracts of the 8th symposium. The largest part of the proceedings deals with placoderms (nearly 30%), two papers on tetrapods referred to Romer's gap, and an essential part (15%) was on biostratigraphy with microvertebrates. The extended abstracts of the 8th symposium (Lelièvre *et al.* 1995; Text-fig. 7C) were published also in 1995. The presentations on the 8th symposium differed from all other symposia in that microvertebrate biochronology was a large part (17 abstracts), and histology (mostly "agnathans") and actinopterygians were present with 12 papers each. Surface structure of acanthodian scales similar to that of gan-

oine of actinopterygians was published for the first time (Derycke and Chancogne-Weber 1995).

The proceedings of the 9th symposium appeared in a special issue of the Journal of Vertebrate Paleontology (Elliott and Gottfried 2001). The contributions covered the field from "agnathans" to tetrapods with more on elasmobranchs compared to the other groups. Maisey and Anderson (2001) published an elasmobranch braincase from South Africa with a ventral otical fissure as in *Pucapampella* from the Devonian of Bolivia (Maisey 2001). Also in the same issue, Basden and Young (2001) published the braincase of the basal actinopterygian *Ligulalepis* with an eye stalk, a structure earlier thought to be restricted to chondrichthyans. The proceedings of the 10th symposium (Richter 2005) contained few papers, with half of them on chondrichthyans, as well as a report on the first ten symposia of the series (Schultze 2005).

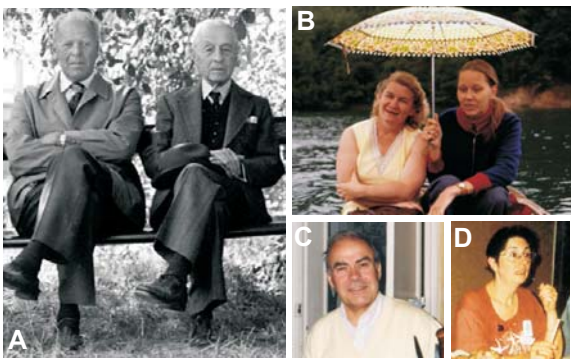
Laudationes of V. Karatajūtė-Talimaa and E. Mark-Kurik (Schultze *et al.* 2009), and a review of the international influence of the "Stockholm School" (Schultze 2009) preceded the contributions on Palaeozoic and recent fishes in the proceedings on "agnathans" to tetrapods in the 11th symposium (Ahlberg *et al.* 2009; Text-fig. 7D). Articles on chondrichthyans represented nearly a fourth of all contributions, with two articles on braincases; the iniopterygians were represented for the first time in the proceedings (Text-fig. 7D). The osteichthyans (including tetrapods) were more strongly represented than in other proceedings. Two papers dealt with damage caused by parasites (Lukševičs *et al.* 2009) or by biting (Lebedev *et al.* 2009).

The proceedings of the 12th symposium (Elliott 2012) contain few contributions similar to those of the 10th symposium, with half of them on chondrichthyans and one on the early history of vertebrate paleontology in Texas (Jacobs *et al.* 2012). No abstracts nor proceedings of the 13th symposium were published, whereas M. Ginter revived the custom of publishing proceedings. A review of 50 years of symposia (Schultze this volume) precedes 13 contributions (nearly half on chondrichthyans) in the proceedings of the 14th symposium.

HONORS AND STENSIÖ AWARDS FOR YOUNG SCIENTISTS (Table 3 and Text-fig. 8)

The symposium series started with the Fourth Nobel Symposium, arranged to honor Erik A:son Stensiö. E. Stensiö, founder of the "Stockholm or Swedish School", dominated paleoichthyology for half a century and had great influence especially outside Sweden (Patterson 1990; Schultze 2009). He changed the way fossil vertebrates were treated, considering them as extant specimens embedded in rock and searched for all features, which could help him reconstruct soft anatomy. He introduced new methods of investigation, especially a very fine application of the serial section method. As a workaholic, he produced many important memoirs, which appeared to be comparative anatomy of fossil fishes. Some colleagues had problems, at the beginning, to accept the reconstruction of vessels and nerves following the preserved canals and foramina (Patterson 1990). Except for occasional disagreement in the interpretation of one or another nerve or vessel, the reconstructions are generally accepted today.

The second symposium was again a special symposium of the Linnean Society to honor E. A:son Stensiö and his famous disciple Erik Jarvik (White



Text-fig. 8. Honored persons: A – 1972 E. Jarvik and E. A:son Stensiö (picture taken in 1975 by U. Samuelsson); B – 2007 V.N. Karatajūtė-Talimaa and Elga Mark-Kurik (picture taken in 1977 by H.-P. Schultze); C – 2015 D. Goujet (picture taken in 1992 by H.-P. Schultze); D – 2017 S. Turner (picture taken in June 1991 by H.-P. Schultze).

1st Symposium	in honor of E. A:son Stensiö
2nd Symposium	in honor of E. A:son Stensiö and E. Jarvik
11th Symposium	in honor of V. Karatajūtė-Talimaa and E. Mark-Kurik
13th Symposium	honoring D. Goujet
14th Symposium	honoring S. Turner
Young researcher Stensiö award to:	
13th Symposium	Lauren Sallan and Sophie Sanchez
14th Symposium	Samantha Giles

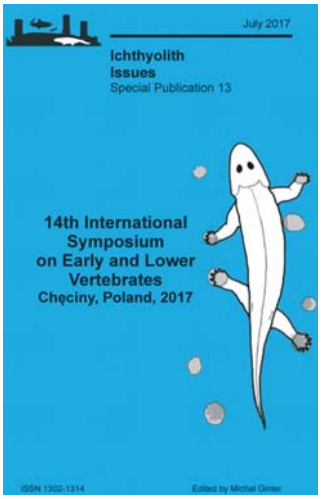
Table 3. Honors and awards given in the 50 year history of the Early/Lower Vertebrate symposia

1973; Text-fig. 8A). Jarvik used Stensiö's detailed serial section method to study the anatomy of one specimen of *Eusthenopteron*, to such detail that *Eusthenopteron* is besides the extant *Amia* the best-known fish. Both Stensiö and Jarvik were very open and helpful to colleagues and students, nevertheless they insisted on their own interpretations. They were always willing to distribute their knowledge to others; nevertheless, expected colleagues to accept their views.

Although the series of early/lower vertebrates symposia started with two symposia honoring the most influential paleoichthyologist of the 20th century, it did not continue that way. A surprising 40 years later, the organizers of the 11th symposium in Sweden started with honors again; this time two pupils of the Russian paleoichthyologist D.V. Obruchev, Valentina N. Karatajūtė-Talimaa and Elga Mark-Kurik (Schultze *et al.* 2009; Text-fig. 8B), were honored for their work. Both started with studies of placoderms and widened their scope to agnathans. Most of their contributions were concerned with biostratigraphy of the Arctic and Baltic/Russian platform deposits.

For the 13th symposium in Melbourne, Australia, Daniel Goujet (Text-fig. 8C), "Mister Placoderm", was selected for honors. He participated in all symposia, except the second and last one. He published mainly on placoderms. He was instrumental in introducing cladistic in France and was a founding member of the Société française de Systématique in 1984. Over the years, he was involved in the European taxonomy project CETAF (Consortium of European Taxonomic Facilities; Matile *et al.* 1987), and for years the organizer of Parsyst (Paris Natural History Museum's Systematics Collections).

For the 14th symposium, Susan Turner was honored (Text-fig. 8D). She devoted her scientific work to the thelodonts (Märss *et al.* 2007) and biostratigraphy. She is adamant in promoting female scientists in geology and paleontology and publishing on their accomplishments. She puts all her strength behind projects that she thinks are important, such as biostratigraphy, where she organized and pushed for IGCP projects (Blieck and Turner 2000), female accomplishments, and that conodonts are not vertebrates (Turner *et al.* 2010). She organized cooperation in biostratigraphy, founded a special information outlet called Ichthyolith Issues, and published Ichthyolith Issues, Special Publications with abstracts of IGCP meetings, as well as the early/lower vertebrates symposia abstracts of symposium 11 (Ichthyolith Issues, Special Publication 10), symposium 12 (Ichthyolith Issues, Special Publication 12) and 14 (Ichthyolith Issues, Special Publication 13; Text-fig. 9).



Text-fig. 9. Example of cover page of abstract volume.

In Dallas, Texas at the 12th symposium, it was decided to introduce an award for young scientists and to name it after E. A:son Stensiö, who was honored for his accomplishments in the two first symposia. The award should enhance early career researchers within ten years after their Ph.D. The first Stensiö award was given to Lauren Sallan and Sophie Sanchez at the 13th symposium in Melbourne, Australia, in 2015, and the second to Samantha Giles at the 14th symposium in Chęciny, Poland in 2017.

FINAL REMARKS

The symposia on early/lower vertebrates started as special reverence to E. A:son Stensiö and the "Stockholm School". They initiated interaction and cooperation among scientists studying Paleozoic vertebrates, so that it has had a lively history over the last 50 years.

Especially close was the cooperation among those interested in biostratigraphy of fish remains. These colleagues had, in addition, long lasting projects and meetings outside the symposia on early/lower vertebrates. Their results were published separately (e.g., Blieck and Turner 2000). Most times, the results of the symposia were published in proceedings. Recent symposia started again to honor accomplished scientists in the field and to award young researchers for their successful start in the field of early/lower vertebrates.

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