

### Cephalopods

#### **1. Cephalopods From The Upper Cretaceous, By Dirk Fuchs**

Although the “Vampyropoda-hypothesis” has been largely supported (Engeser and Bandel, 1988; Engeser, 1988; Haas, 2002; Donovan et al., 2003; Klug et al., 2005; Fuchs, 2006a, 2006b; Fuchs et al., 2007b), the systematic position of the Prototeuthidina remains a source of considerable **debate** (Donovan and Toll, 1988; Young et al., 1998; Vecchione et al., 1999; Bizikov, 2008). Page 234

Although the phylogenetic value is still poorly known (even in living taxa), the cephalic cartilage morphology of Dorateuthis also indicates closer affinities with vampyropods than with teuthids (compare Nixon, 1998, fig. 3). Page 245

The phylogenetic origin of the Prototeuthidina within the vampyropods is still unsolved. Page 246

Despite this incomplete knowledge related to the direct origin of the Prototeuthidina, polarization of some character states can be ascertained. Page 247

#### **2. Ontogeny And Heterochrony In Ammonoids, By Daniel A. Stephen**

One reason for this dearth of study is that most extant cephalopods are coleoids, which lack shells, and therefore, have a meager fossil record. Consequently, the phylogeny of the Coleoidea is not known in detail, and analysis of ancestor-descendant taxa is essentially impossible at this time. Page 818

In contrast to the situation with modern cephalopods, there are numerous papers on heterochrony in ammonoids. Indeed, ammonoids have been a favorite battleground for **debate** since the time of Hyatt and the infancy of heterochronic research. Examples have come from both the Mesozoic and the Paleozoic. Page 818

#### **3. Cephalopod origin and evolution, By Bjorn Kroger**

Different paleontological hypotheses have been proposed for the origin of cephalopods among fossil Cambrian monoplacophoran-like molluscs and other forms. Page 605

The now classical, but **debated**, hypothesis of cephalopod ancestry is that Plectronoceras derived from the tall, conical, bottom-living (benthic) mollusc Knightoconus which has walls in the shell (septa) that separate multiple chambers. Page 605

The reconstruction of the phylogeny of fossil coleoids is complicated by the rarity of fossils and often times incomplete preservation. The existence of Paleozoic representatives of the ten armed squids (Decabrachia) is currently under discussion. Page 609

Similarly, the origin of the eight-armed vampyropods is still **debated**. Page 609

#### **4. Phylogeny of coleoid cephalopods, By Jan Strugnell**

The resolution of higher level phylogeny of the coleoid cephalopods (octopuses, squids, and cuttlefishes) has been hindered by homoplasy among morphological characters in conjunction with a very poor fossil record. Initial molecular studies, based primarily on small fragments of single mitochondrial genes, have produced little resolution of the deep relationships amongst coleoid cephalopod families. Page 426

However, phylogenetic relationships between the nine Incirrata families (Supplementary Appendix 1) are less clear and have been **debated** extensively in the literature (Naef, 1921–1923; Robson, 1929, 1931; Voight, 1997; Voss, 1977; Young and Vecchione, 1996). Page 427

Although each of these families and suborders are understood to form monophyletic groups, there is much **debate** concerning the validity of the ordinal level of classification (Berthold and Engeser, 1987; Naef, 1921–1923; Voss, 1977; Young and Vecchione, 1996). Page 427

(COI), were sequenced (Supplementary Appendix 1). The most appropriate method for analysing multiple genes in phylogenetic analyses is an issue of some **debate** (DeBry, 2003; Huelsenbeck et al., 1996). Page 428

#### **5. Divergence time of Spirulida and Sepiida, By Kerstin Martina Warnke**

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The phylogenetic position of the mesopelagic decabrachian cephalopod *Spirula* is still a matter of **debate**. Page 390

Molecular characters also yield contradictory indications as to the position of *Spirula* (for discussion see Warnke and Keupp, 2005). These differ depending on the gene(s) and the methods of analyses used (Bonnaud et al., 1994; Carlini et al., 2000; Warnke et al., 2003). Fossil records of coleoids are generally scarce. Widely accepted is *Ceratisepia* (70 mya) as the stem group of the Sepiida and *Groenlandibelus* (100 mya) as the stem group of the Spirulida (Benton, 1993; Hewitt and Jagt, 1999, Keupp pers. comm.). Older fossil records remain ambiguous as it is still unknown whether the late Carboniferous *Shimanskya* (Doguzhaeva et al., 1999) belongs to the spirulids (Hewitt and Jagt, 1999; Keupp pers. comm.). Thus the age in which Spirulida originated is still unclear. Page 390

Thus the origin is still uncertain and does not agree with fossil records. Page 390

Whether *Shimanskaya* is a member of the Spirulida is still a matter of **debate** (Doguzhaeva et al., 1999; Hewitt and Jagt, 1999). Page 393

### **6. Mitochondrial genome structure, By Shin-ichi Yokobori**

There are several important issues concerning coleoid phylogeny which are still under **debate**, including (1) relationships between octopuses, vampire squids, and decapods. Page 899

### **7. Relationships among cirrate octopods, By Stuart B. Piertney**

There has been considerable **debate** (O\_Shea, 1999; Robson, 1932; Villanueva et al., in press; Voss, 1988a,b) about which morphological characters should be used to define cirrate phylogeny. Page 352

### **8. Evaluation of the squid genus *Illex*, By David B. Carlini**

Validity of *I. oxygonius* as a separate species has been a matter of considerable **debate** (Roper et al., 1998). Page 496

## References

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6. **Divergence time of Spirulida and Sepiida, By Kerstin Martina Warnke, Molecular Phylogenetics and Evolution, 2011, Volume 58, Pages 390–394**
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