1. INTRODUCTION

When a budding Liverpool rock band was looking for a name, it is not surprising that they chose such a well known entity as the beetle (with just a twist of Lennon). There are ~420 000 named species of Coleoptera in the world (Ślipiński *et al.* 2011), more species than there are vascular plants or fungi and 75 times as many as there are mammals. Beetles occupy virtually every non-marine habitat in the world and are enormously diverse in structure and in size; the largest of them, *Titanus giganteus* (Linnaeus) from South America and *Xixuthrus heros* Heer from Fiji (both Cerambycidae: Prioninae) may attain a length of 200 mm, more than 600 times as long as the smallest ones, the nanoselline Ptiliidae, which may be 0.3 mm in length and fall well within the size range of protozoans like *Paramecium*. J. B. S. Haldane's famous comment on the Coleoptera has been quoted or misquoted many times (Hutchinson 1959; Crowson 1981; Fisher 1988; Gould 1993; Farrell 1998). The only printed statement we could find is in a report on a lecture on the biological aspects of space flight, given in 1951 before the British Interplanetary Society. Apparently, Haldane remarked that 'the Creator, if He exists, has a special preference for beetles, and so we might be more likely to meet them than any other type of animal on a planet that would support life' (Slater 1951; Clarke 1968).

The English common name 'beetle' comes from the Middle English *bityl* or *betyll* and the Old English *bitula,* meaning 'little biter' (from the word *bitan,* to bite). Two equally common English words, which have come to be used for specific beetle groups are 'weevil', (now applied to the superfamily Curculionoidea) and 'chafer' (now used for the scarabaeid subfamily Melolonthinae). The former is derived from the Middle English word for beetle, *wivil* or *wevel*, and the Old English *wifel*, and it was often used to refer to stored products pests. The latter comes from the Middle English *cheafer*, the Old English *ceafor* and the Old High German *kevar.* This last word also gave rise to the modern German word for beetle, 'Käfer'. Like the English common name, the German one also relates to biting, since it derives from the Middle High German word *kivel* or *kiver*, meaning 'jaw'.

The technical name for beetle is Coleoptera, which dates from the writings of Aristotle in the fourth century B.C.; he described those insects with wing cases (or elytra) as Κολεοπτεροσ (coleopteros), literally meaning 'sheath winged'. In some modern languages, this classical word is used as the common name for beetle (e.g. coléoptère in French). The Greeks and Romans had many terms for particular kinds of beetles and several these were adopted by Linnaeus (1758) as generic names (used today primarily for Northern Hemisphere species that often are types of the major beetle families); examples are *buprestis, carabus* (*karabos*), *curculio, kantharis, kerambyx, scarabaeus, silphe* and *staphylinos.*

Although Aristotle's definition is probably sufficient for the average person to identify many common beetles, an 'air tight' definition of the order that covers all exceptions, is much more difficult to provide. Beetles are **holometabolous** or **endopterygote** insects; that is they have **complete metamorphosis** with distinct larval, pupal and adult stages. The larvae usually undergo several moults, but the different instars tend to resemble one another and are quite different from the adult. In contrast, the **hemimetabolous** or **exopterygote** insect orders (such as the Blattodea, Dermaptera or Hemiptera) undergo an incomplete or partial metamorphosis, where larvae or nymphs usually resemble the adult, with wing pads and genitalia that increase in size with each moult. Beetle larvae never have wing pads, genitalia, compound eyes or more than a single tarsal segment (combined with the tibia in two of the four suborders) and they rarely have more than four antennal segments. Some female adults, however, may retain larval characteristics. The evolution of insect metamorphosis has been reviewed by Sehnal *et al.* (1996).

The following are usually given as diagnostic for adult Coleoptera:

1. The head is usually inserted into the anterior part of the prothorax, concealing the basal membrane.
2. The antennae almost always have 11 or fewer segments, exceptions being Rhipiceridae and a few Cerambycidae, where males have modified multi-segmented antennae, and a few other groups that have the last antennal segment subdivided.
3. The mouthparts are almost always **mandibulate** or of the chewing type with mandibles moving in a horizontal plane (rarely suctorial or reduced), and with maxillae bearing maxillary palps. This feature distinguishes adult beetles from bugs (Hemiptera).
4. The body is usually more or less depressed, so that coxae and pleural regions lie ventrally; the procoxae and mesocoxae are usually deeply recessed into coxal housings called **coxal cavities** and the metacoxae are usually slightly recessed and transversely oriented, sometimes with posterior excavations for the reception of the hind femora. The coxae are only weakly recessed in Archostemata and coxal cavities are secondarily lost in some groups of Polyphaga, but in most other orders the coxae tend to be completely exposed and more laterally placed.
5. The prothorax is well developed, almost always free, and forms with the head a distinct fore body, contrasting with the hind body (the reduced mesothorax, the enlarged metathorax and the abdomen). In most endopterygote orders, the prothorax is reduced and more closely associated with the mesothorax, which is at least as well developed as the metathorax.
6. At least the mesosternum and metasternum are invaginated at the midline, so that they are represented externally only by a groove, the **discrimen** (secondary lost in some groups), and internally by apodemes or furcae called **endosternites**, and compound ventral sclerites, referred to as **mesoventrite** and **metaventrite** and composed of pleural and precoxal elements, are expanded to occupy all of the ventral surface in front of and between the meso- and metacoxae. The invagination of the meso- and metasterna