What, exactly, is the world’s largest insect? Most introductory entomology courses probably report that it is “the Goliath beetle of Africa,” and that is the answer you get from the ever-popular Guinness World Records as well. A variety of scientific names are given for this beast, but according to the last professional revision of the genus, by J. T. Wiebes of the Leiden Museum (1968), all the really big Goliath beetles should be classified as subspecies of Goliathus goliatus (yes, without an “h” in the specific epithet, and including G. g. regius, G. g. orientalis, and the like). I personally love these beetles and have since childhood, and I am currently rearing them for study as well. That’s why it’s so painful to admit that they are actually not the world’s largest insects.

Among beetles, according to the online “University of Florida Book of Insect Records,” three general sorts of critters more or less tie for the title of heaviest: Goliath beetles, two species of Megasoma rhinoceros beetles, and the huge longhorn beetle Titanus giganteus. All appear to be capable of attaining an adult weight of 45 g, at least as maximum-size males. It turns out, however, that entomologists are not terribly interested in weighing live bugs; they are much better at measuring how long they are once they are dead. Thus, the 45-g figure comes from guesstimates and extrapolations, not from real measurements, reported in the real literature, made by real entomologists with real equipment and real beetles.

I can tell you, from my own work, that a 70-mm male Goliath weighs about 22 g when it first emerges from the pupa, but only 14 g once it voids its meconium (the waste products left over after metamorphosis). Even after months of feeding, the weight does not increase after that. This makes it difficult to believe that a full-sized, 11-cm male would weigh 45 g, but not impossible, I suppose.

As of now, the one and only quasi-reliable figure is a weight of 42 g for a 10 cm male G. goliatus goliatus, which was wild-collected in Cameroon, photographed (and presumably weighed) by a German hobbyist named Matthias Frei, and posted in an online paper by Karl Meier. Meier’s paper was in turn edited and updated by C. Campbell (a very enthusiastic and helpful man who sadly admits that he has “never worked with Goliathus directly”).

Ah, but it turns out that the beetle story may be moot. As the University of Florida Book of Insect Records acknowledges, well-known entomologist and photographer Mark Moffett (1991) reported, in National...
Geographic that the world's largest insect is actually a weta, a sort of gigantic grig from New Zealand. Mark weighed a gravid female Deinacrida heteracantha, and came up with a whopping figure of 71 g. Everyone admits that this species of weta rarely gets this big, but this must be the end of the story: beetles lose, or do they?

Back to the Goliaths. The biggest males I have reared were about 7 cm long, and they came from larvae that weighed about 50 g. My biggest larva maxed out at 67 g, and is now a pupa. But the champion breeder is Karl Meier (2004), who reports that his heaviest larva weighed 80 g, thus reclaiming the title of world's biggest bug from the tarsal clutches of the Kiwi Cricket!

When you think about it, this makes perfect sense. Among insects with complete metamorphosis, the larva (just before pupation) represents the heaviest point in the life cycle. The Goliath larva loses weight as it wanders in search of a pupation site, and it loses more weight while lining the inside of its earthen pupal cell with an anal secretion. Pupation results in further losses, and the adult comes out at about half the maximum larval weight, dropping to half again when it voids the meconium. A 45-g adult Goliath should in theory come from a 90-g larva and spend most of its adult life at a weight of about 22.5 g. Sounds reasonable to me, and it makes one wonder why we entomologists are so terribly prone to anti-larval prejudices when it comes time to brag about big bugs.

Clearly, then, the world's biggest bug is a grub. It isn't necessarily a Goliath beetle grub, but it's a grub. And to learn more, we must reenter the world of rumor and speculation. In 1959 National Geographic legend Paul Zahl photographed an unidentified long-horned beetle grub from the Amazon Basin that was clearly longer than any Goliath (a little over 20 cm) and about as big around. He thought it might be the larva of Titanus, but admitted that it might be some other sort of gigantic long-horned beetle (and the larva of Titanus is still undescribed). Zahl, however, did not weigh his prize, and he spent most of his article boasting about how big the (obviously smaller) adult Titanus could become.

Among rhinoceros beetles, we are fortunate to have beetle breeders to turn to for reliable measurements of weights. The larvae of rhino beetles are generally thicker and more c-shaped than those of flower beetles, the group to which the Goliaths belong, or long-horns for that matter. Randy Morgan, at the Cincinnati Zoo Insectarium, weighed a big Hercules beetle larva for me (Dynastes hercules), at 98.4 g. He noted that it was not the largest larva the zoo had reared (in a culture they have maintained for 25 years, an achievement that won them the Edward H. Bean Award from the American Zoo and Aquarium Association).

Returning to the ever-confusing Internet, a beetle breeder in Japan (breeding scarabs is a huge hobby over there), who goes by the nickname “Tsuki” reports a maximum larval weight of 144 g for Dynastes hercules; and he shows a very convincing photo to make his point. A friend and Japanese translator, Mr. Konishi, contacted this man on my behalf, and reports the following: Mr. Tsukiji Takuro of Kamakura City, Kanagawa Prefecture, reared the giant larva in his home office and weighed it on a Tanita Digital Solar Cooking Scale. Given the specifications of this scale, the official weight should therefore be “144 g ± 1 g.” The resulting adult male was 147 mm long (not a record by any stretch) and a member of the subspecies D. h. lichyi. Mr. Tsukiji believes that 150-g larvae are possible and that D. hercules may have the largest larvae of any beetle.

Keep in mind, however, that D. hercules adults are big (37.4 g maximum, according to tropical entomology pioneer William Beebe), but they are not the biggest rhino beetles, and no one has ever suggested that they are. That title goes to Megasoma actaeon, and M. elephas, two very stocky creatures from South and Central America. The question is, how much do their larvae weigh? (Believe me, I’m trying to get hold of some of these things to rear them and weigh them while filling out an affidavit in the presence of a Commissioner of Oaths. But that hasn’t happened yet, so for the moment, I am in awe of the 144-g Hercules.)

With respect to Megasoma rhino beetles, Brett Ratcliffe of the University of Nebraska, and Miguel Moron of the Instituto de Ecología in Veracruz, (2005) have described the larvae of both these species. Seriously—these species were undescribed until 2005. The larva of the Goliath beetle remains undescribed as well, and I am working on that. Ratcliffe and Moron do not give weights for Megasoma larvae, but they do give a maximum dorsal length of 225 mm for the third instars of M. elephas.

The D. hercules that Randy Morgan weighed had a dorsal length of 180 mm. If we extrapolate arithmetically, we come up with a possible weight of 123 g for a big M. elephas, still below Mr. Tsukiji’s record, but big nonetheless.

Where does that leave us? Well, the next time I give an introductory insect talk, I’m going to say the following. First, the world’s biggest adult insects overall are the larvae of some kind of beetle. It may be Megasoma elephas; it may be M. actaeon; or it may be Titanus giganteus. No one knows, because entomologists don’t like to weigh things. (This is odd, since science is based largely on evidence, but hey, that’s how it stands right now.) As of today, the heaviest reported insect is a South American Hercules beetle larva that lived in a home office in Japan and metamorphosed into a large, but not huge, adult. As for the famous Goliath
beetles, well, they no longer hold the title of world’s biggest bug, but they are still in the running for World’s Coolest, not that anyone is keeping track.

What does this all mean? It tells us that we still have some basic work to do in the science of entomology. With respect to the world’s largest insects, we may be at the same stage as dinosaur science before the “dinosaur renaissance” that began in the 1970s. Before then, it was generally believed that dinosaurs were not legitimate subjects for serious study, and we knew pretty much all we needed to know about them.

And speaking of the charismatic mega-fauna, I now like to point out to my vertebrate-centric friends that a 144-g insect weighs more than 42% of the mammals that live in Alberta, my home, (at maximum size, no less) and 63% of the birds! At 144 g, give or take, the world’s biggest bug is about the size of an obese blue jay, and that’s something I am very, very proud to report.

Sources and Additional Information


John Acorn lectures at the University of Alberta. He is an entomologist, broadcaster, and writer, and is the author of fifteen books, as well as the host of two television series.