= Avitomyrmex =

Avitomyrmex is an extinct genus of bulldog ants in the subfamily Myrmeciinae which contains three described species . The genus was described in 2006 from Ypresian stage (Early Eocene) deposits of British Columbia , Canada . Almost all the specimens collected are queens , with an exception of a single fossilised worker . These ants are large , and the eyes are also large and well developed ; a sting is present in one species . The behaviour of these ants may have been similar to extant Myrmeciinae ants , such as foraging solitarily for arthropod prey and never leaving pheromone trails to food sources . Avitomyrmex has not been assigned to any tribe , instead generally being regarded as incertae sedis within Myrmeciinae . However , its identity as an ant has been challenged , although it is undoubtedly a hymenopteran insect .

= = History and classification = =

Avitomyrmex is an extinct genus of ants with three described species . Fossils of Avitomyrmex , along with other extinct Myrmeciinae ants were first studied and described by Bruce Archibald , Stefan Cover and Corrie Moreau of the Museum of Comparative Zoology in Cambridge , Massachusetts . They published their 2006 description of the genus and species in an Annals of the Entomological Society of America journal article . The genus name is a combination of the Latin " avitus " meaning " ancient " or " grandfatherly " and the Greek myrmex , meaning " ant " .

Included with the genus description , the paper contained the description of Avitomyrmex mastax , Avitomyrmex systenus , and the type species Avitomyrmex elongatus . These fossil species date back to the Middle Ypresian .

Archibald and colleagues originally classified Avitomyrmex as incertae sedis (Latin for " of uncertain placement ") within the ant subfamily Myrmeciinae , as the specimens are unable to be properly identified . In 2008 , however , Cesare Baroni Urbani of the University of Basel , Switzerland , noted that no specimen in this genus allows a proper examination of the apomorphy (key diagnostic traits) of the subfamilial or familial characters . While Baroni Urbani excludes Avitomyrmex from Myrmeciinae and classifies it as incertae sedis in Hymenoptera , the morphological characters and wings show the specimens are undoubtedly a hymenopteran insect . A 2012 report by Russian palaeoentomologist Gennady M. Dlussky of the Moscow State University describing new myrmecines accepted the classification of Archibald and colleagues without mentioning the comments of Baroni Urbani .

The following cladograms generated by Archibald and colleagues show two possible phylogenetic positions of Avitomyrmex among some ants of the subfamily Myrmeciinae ; the cladogram on the right included three additional extinct genera compared to that on the left . It is suggested that Avitomyrmex may be closely related to other extinct Myrmeciinae ants such as Macabeemyrma and Ypresiomyrma , as well as the extant Nothomyrmecia macrops .

= = Description = =

There are several characters which separate Avitomyrmex from other ant genera . The most notable feature is the distinctly slender nature of the queens and workers morphology . This is shown clearly in the shape of the petiole connecting the thorax and the abdomen . While similar to the modern myrmeciine genus Nothomyrmecia of Southern Australia , the two genera are distinguishable by the structure of the petiole , with Avitomyrmex lacking the peduncle seen in Nothomyrmecia . The eyes are large and well developed , the mandibles are subtriangular but poorly preserved , and a sting is present on examined A. systenus fossils . As for A. elongatus and A. mastax , it is unknown if the two ants have a sting , due to either poor preservation or the sting has not been preserved at all .

= = = A. elongatus = = =

A. elongatus was described from a single side of a compression fossil found from the Middle Ypresian McAbee Fossil Beds , Kamloops Group , near Cache Creek , British Columbia . The incomplete specimen of a queen , numbered 2003.2.8CDM032 , is currently preserved in the paleontology collections housed at the Courtenay and District Museum , Courtenay , British Columbia . Archibald , Cover , and Moreau coined the specific epithet from the Latin " elongatus " meaning " prolonged " in reference to the elongated morphology of the type specimen . The species is discernible from the other two species of Avitomyrmex by its notably larger size , the preserved portion of the ant being over 20 millimetres (0 @.@ 8 inches) . The forewings are almost as large as the specimen , measuring around 18 millimetres (0 @.@ 7 inches) while the hindwings are too poorly preserved to be studied . The holotype is preserved with a partly disarticulated gaster and is missing her head .

= = = A. mastax = = =

The second species described from the McAbee Fossil Beds is A. mastax which , unlike A. elongatus , is known from two specimens . The holotype and paratype are both included in the Thompson Rivers University , Kamloops collections as UCCIPRL @-@ 18 F @-@ 850 and UCCIPRL @-@ 18 F @-@ 929 respectively . The holotype specimen is a partial queen which is incomplete , with one forewing and the head fairly preserved , and the other isolated body portions indistinct . The paratype is a mostly complete queen missing parts of her gaster , legs and hind wings . Overall the species is estimated to have been 15 millimetres (0 @.@ 6 inches) long and has a forewing length of 13 millimetres (0 @.@ 5 inches) . A. mastax is distinguishable from the other species in Avitomyrmex by its smaller mandible size , being less than half the length of the head with eight teeth , and additionally the shape of the head capsule . The specimen also has large compound eyes . The specific epithet mastax is from the Greek " mastax " meaning " jaw " or " mandible " , a reference to the small size of the mandibles compared to the other species of Avitomyrmex .

= = = A. systenus = = =

Of the three described species of Avitomyrmex found at the McAbee Fossil Beds , only A. systenus is known from worker caste specimens . The holotype is currently deposited in the Courtenay and District Museum paleontology collections as 2003 @.@ 2 @.@ 11 CDM 035 while the paratype , UCCIPR L @-@ 18 F @-@ 989 , and an additional hypotype worker , UCCIPR L @-@ 18 F @-@ 825 , which is tentatively assigned to the species are both deposited in Thompson Rivers University collections . Based on the mostly complete workers , mature specimens are estimated to have been 15 millimetres (0 @.@ 6 inches) . Due to the size of adult workers they cannot be attributed to A. elongatus while the overall petiole , head capsule and mandible structure distinguish it from A. mastax . The eyes are large and one @-@ third the length of the head , and the legs are indistinctly preserved but long . The pronotum is almost flat , and the gaster is narrow . The shape of the head was the basis for Archibald , Cover and Moreau choosing the specific epithet systenus , which is from the Greek word systenos meaning " tapering to a point " .

= = Ecology = =

Archibald and colleagues suggested that the life habits of Avitomyrmex species may have been similar to that of extant Myrmeciinae ants . These ants may have nested in the soil or in trees , possibly being an arboreal nesting genus . This may be the case as one Myrmecia species is known to inhabit trees exclusively . Workers most likely preyed on arthropods , killing them with their sting and fed on nectar ; workers would have been found foraging onto trees or low vegetation without leaving any pheromone trails to food sources or recruit nestmates , as they were solitary foragers . Avitomyrmex ants most likely used their large eyes to locate prey and for navigational purposes .