

the Tortonian, the stages *Sarmatian* and *Pontian* are recognized in Dauphiné, Austria, and Italy.

Some of the Miocene genera are *Pliopithecus*, *Dryopithecus*, of *Quadrumanes*; *Machærodus*, *Felis*, *Hyænarcos*, *Hyæna*, *Canis*, *Viverra*, *Mustela*, of *Carnivores*; *Mastodon* (*M. longirostris*, *M. tapiroides* Cuv., etc.), *Elephas*, *Dinotherium*; *Rhinoceros*, *Listriodon*, *Sus*, *Anchitherium*, *Hipparion*, *Equus*, *Hippopotamus*; *Camelopardalis*, *Antelope*, *Cervus*, of *Ruminants*; *Erinaceus*, *Talpa*, of *Insectivores*; *Halitherium*, *Squalodon*, *Physeter*, *Delphinus*.

The Tertiary Mammals of the Siwalik Hills, India, from beds now referred to the Pliocene, include, besides *Quadrumana*, species of *Hyænarcos*, *Hyæna*, *Machærodus*, *Felis*, *Canis*, *Mustela*, *Viverra*; *Elephas*, *Mastodon*, *Rhinoceros*, *Hexaprotodon*, *Hippotherium*, *Equus*, *Hippopotamus*, *Sus*, *Anoplotherium*, *Chalicotherium*, *Merycopotamus*, *Camelus*, *Camelopardalis*; *Sivatherium*, *Antelope*, *Moschus*, *Cervus*, *Ovis*, *Bos*; *Dinotherium*; *Hystrix*; *Enhydriodon*. The *Sivatherium* was an elephantine Stag, having four horns, allied to the Deer, but larger, being in some points between the Stags and Pachyderms. It is supposed to have had the bulk of an Elephant, and greater height. *Bos* and the related genera probably occur nowhere earlier than the Pliocene. There were also *Crocodyles* of large size, and the great turtle *Colossochelys Atlas*.

In southern South America, the *Santa Cruz* beds, which are referred to the Miocene, afford species of *Edentates*, *Rodents*, *Marsupials*, *Nesodon*, *Toxodon*, *Prototherium*, *Prosqualodon*, *Argyrocetus*, *Odontoceti*, or Toothed Whales, and other species.

The following new Miocene species from East Siberia have been described and figured by W. H. Dall: *Semele Stimpsoni*, *Siphonaria Penjinæ*, *Conus Okhotensis*, *Cerithium cymatophorum*, *Diloma ruderata*; and he has identified also *Ostrea gigas* Thunberg. They occur in a bed in the northeastern angle of the Okhotsk Sea, on a small bay in the Gulf of Penjinsk containing a layer of coal. They were brought from the region in 1855 by Wm. Stimpson, a member of the Ringgold and Rogers Exploring Expedition. The fauna is related to that of the China and South Japan seas, and indicates, states Dall, a change downward of water-level between the Miocene of 30° to 40° E.

Lower Pliocene. — **MESSINIAN**, the *Zanclean* beds in Italy of Seguenza, and over the *Zanclean* beds, along the Apennines, *Plaisancian* of Seguenza.

Upper Pliocene. — **ASTIAN.** — Crag of Norwich, etc., Eastern England; Subapennine marls and sands of beds of Val d'Arno. In the Red Crag, *Felis pardoides* Owen, *Mastodon Arvernensis* Croizet & Jobert (*angustidens* Owen), *Rhinoceros Schleiermachi* Kaup (*incisivus* Cuv.), *Tapirus priscus* Kaup (*Arvernensis* Croizet & Jobert), *Cervus anoceros* Kaup. In the Norwich Crag, *Mastodon Arvernensis*, *M. longirostris*, *M. Borsoni*, *Elephas meridionalis*, *Cervus Falconeri*, *C. verticornis*.

Forest bed of Cromer on the east coast of England, referred by many to the Lowest Quaternary, includes, besides the Cave Bear, the Irish Deer; and several modern species, as the Beaver, Wolf, Fox, Stag, Aurochs, Mole, Wild Boar, Horse; also the European Pliocene species, *Ursus Arvernensis*, *Cervus Polignacus* Robert, *Hippopotamus major* Cuv., *Rhinoceros Etruscus*, *R. megarhinus*, *Elephas meridionalis*, *E. antiquus*, *Equus Stenonis*, and without any remains of man. The Forest bed is made Pliocene in the Manuals of Etheridge and H. B. Woodward, but lower Glacial by Geikie and others.

The Pikermi Middle Pliocene beds in Greece contain out of 29 genera of Mammals, 18 that are found also in the Middle Pliocene of the Siwaliks of India; there is the same remarkable abundance of true Ruminants, and among them, as in the Siwaliks, several species of *Giraffide* and *Antelope*; there are at Pikermi 15 Ruminants to 1 Pig and 1 *Chalicotherium*, and in the Siwaliks 37 Ruminants to 12 other Artiodactyl Ungulates (Oldham, *Geol. of India*).