

necessarily confined the respiratory organs to the abdominal region. Further, those on the anterior segments of the abdomen would be gradually preferred for specialisation, as being nearer to the cephalothoracic musculature, and to the shelter of the limbs for the protection of the open stigmata. The Scorpionidæ alone, having highly developed musculature in the posterior abdominal segments, have the respiratory invaginations nearly evenly distributed along the middle of the abdominal region.

On the diagram I have further indicated a few suggested homologies. I have elsewhere¹ brought forward evidence in favour of the derivation of tracheæ from setiparous glands. The derivation of poison and spinning glands from similar structures is generally admitted. The consequent homology between the spinning glands and tracheæ requires a slight modification. When, as in the Hexapoda, most Myriapoda, and the Arachnida, the tracheæ are strictly segmental, and intimately associated with limbs, they have probably arisen from the large bristle sacs which secreted the specialised parapodial acicula; spinning glands, on the other hand, are more generally to be deduced from groups of ordinary bristle sacs, although they may also be deduced from acicular glands as well. It is important to bear this qualification in mind, as it helps to throw light on a difficult point in the morphology of the Araneids. While the two pairs of spinning glands on the two pairs of mammillæ are referable to setiparous glands on rudimentary limbs, and probably homologous with tracheæ, there are also, in the majority of spiders, median spinning glands between the mammillæ, which cannot be brought into connection with any rudimentary limbs. This difficulty is, however, fully explained by the position of the abdominal cement glands in the Chernetidæ, which serve to stick the eggs to the abdominal surface, in which position they are carried about by the parent. In these animals we have, on the second and third abdominal segments, median glands (originally paired) occurring *between* the two pairs of tracheal invaginations. In this case I should refer the tracheæ to acicular glands, and the cement glands on the same segment to groups of setiparous glands lying ventrally to the acicula. In the genus *Galeodes*, rows of short powerful bristles actually occur in the corresponding position, *i.e.* close to the median line on the second and third abdominal segments, and form the stigmatic combs, which are quite distinct from the stigmata themselves. According to this derivation we might have two pairs of spinning glands on each segment, one pair placed laterally on mammillæ, and one pair close to the median line between the mammillæ. This arrangement is actually found in the rare spider *Liphistius*, which has four pairs of spinning glands arranged as here described. This is especially interesting, because in addition to other primitive features *Liphistius* is alone among known spiders in retaining at least nine distinct abdominal tergites.²

The facts and suggestions here briefly set forward are a small instalment of the results obtained during my researches on the comparative morphology of the Galeodidæ, which I hope shortly to have ready for publication. I may, perhaps, add that the net results of these investigations go far to establish that classification which ranks the Arachnids as an independent group of the tracheate Arthropods, as distinguished from that which would deduce them from the specialised Crustacean *Limulus* through the specialised Arachnid *Scorpio*.

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THE PRESENT STANDPOINT OF GEOGRAPHY.

MR. CLEMENTS R. MARKHAM, C.B., F.R.S. inaugurated the evening meetings of the new session of the Royal Geographical Society, on Monday night, by a presidential address on the present standpoint of geography. He gave a survey of the state of our actual knowledge of the earth's surface, and pointed out the regions where exploration may still be done. Viewing exact delineation by trigonometrical measurement as the crowning work of geography, he pointed out how incomplete the exact mapping of the land surface of the globe still was, while the delineation of the bed of the ocean had hardly been begun. In the Polar regions, of course, lay the

greatest unknown areas, and the two expeditions now in the field, Nansen's and Peary's, were referred to with some confidence as to their probable success. Mr. Markham himself believed that land exists between Prince Patrick Island and Siberia, which ought to be discovered, and was inclined to accept Lieut. Hovgaard's theory of extensive land north of Cape Chelyuskin. He indicated the delineation of the north coast of Franz Josef Land as one of the more important pieces of Arctic work for the near future. Consideration of the vast Antarctic field was postponed until Dr. Murray's paper at the next meeting.

In Europe there remained scope for detailed survey in many countries, and Mr. W. H. Cozens-Hardy's recent labours on the frontiers of Montenegro are only a foretaste of what has to be done in the Balkan Peninsula. The Cantabrian mountains on the west, and the Caucasus on the east, contain still many isolated unknown patches.

In Africa the unknown had been diminishing within his memory more rapidly than anywhere else, and the days of suddenly-planned expeditions discovering features of the first magnitude had altogether passed. What remain unknown are two great areas in the Sahara, in the Tibesti, and Ahaggar highlands, the negro kingdom of Wadai, and the region stretching from Southern Abyssinia into the Somali Peninsula. In countless places detailed work has to be done, such as Dr. Gregory's study of Mount Kenia, and Mr. Scott-Elliot's similar detailed survey of the Ruwenzori region, just undertaken. The best future work for geography in Africa lies in surveying rather than exploring, and lines of survey should be run across the continent in defined and well-thought-out directions.

Asia has also new ground to break into. The valleys of Hadramant, in Arabia, are almost as little known as the Antarctic regions, and Mr. and Mrs. Bent will shortly endeavour to explore that district. In Asia Minor and Persia much detailed surveying must be done. In Central Asia there is Lhasa, unvisited by an Englishman for generations, and a vast region in north-western Tibet, between 34° and 36° N., and 82° and 90° E. is a blank upon our maps, in spite of the magnificent journeys recently made by Bower, Rockhill, and the Russian explorers. Nearer India, Nepal is little known; Kafiristan is absolutely secluded from the European, and there could be no nobler ambition for a young geographer than to be the first to explore Kafiristan. The maze of mountain ranges and river valleys east of the Himalayas has yet to be unravelled, and the whole interior of Indo-China is full of opportunities for research. Korea, in the far east, is yet far from being fully known. The great Malay Archipelago must receive much more attention, and the problems of western New Guinea alone, with the grand range of the Charles Louis mountains, are well worthy of being seriously attacked. Upraised coral atolls in the Solomon Islands have been reported but not visited. As regards new discovery, however, there is probably no undiscovered islet remaining in the whole Pacific.

Australia, except some desert patches in the west, has been practically explored, although immense areas have still to be surveyed, and the development of colonial geographical societies gives good promise of that continent being thoroughly studied from within.

In North America, Dr. George Dawson enumerates a number of great stretches of land, aggregating several hundred thousand square miles, absolutely untraversed by any intelligent white man. These lie mainly north of the Arctic circle, between the great rivers that flow into the Arctic Sea and in Labrador. Alaska also has its unknown tracts, and even in the United States there is much room for detailed surveys.

Central America is not well known, and in South America much of the Colombian Andes, the basins of the Japura and Putumayo, the whole tract between the Andes and the Orinoco and Rio Negro, are practically unknown. In Peru whole provinces are unexplored, and many peaks unmeasured.

Oceanography is only beginning to yield results, and other departments of generalised physical geography are of growing importance. The better instruction of intending travellers, inaugurated by the Society, and carried out by Mr. Coles, has done much to confer value on the observations of officials, traders, and missionaries, while the more thorough study of theoretical geography, now beginning, requires great extension and elaboration before its work would be thorough.

¹ *Zool. Jahrb.* vol. v. p. 511, and *Ann. and Mag.* January, 1893.

² Cf. "*Liphistius*," R. I. Pocock, *Ann. and Mag.* N. H. October, 1892.