completeness rarely attained in English ones of a similar class. To vivacity of expression and the more purely literary embellishments or literary condiments, they rarely make pretensions ; and yet he who has read in the original the writings of such authors as Haeckel will readily concede that the German style may be not a whit less charming, less simple, and less interesting than the French or English, while at the same time combining, what is often such a fatal defect in many French works on general natural science, a rigid regard for scientific truthfulness. Buffon made many book naturalists, but he has much to answer for in the self-sufficient complacency and inexactness of many of the French naturalists who have succeeded him. It is a rare talent that can excel in attractive literary exposition, and yet command the respect of the critical scientific naturalist.

At least measurably successful as furnishing interesting and instructive reading for the non-scientific intelligent reader, and as an exhaustive storehouse of information for the general student, is the *Allgemeine naturkunde*, a work, of its kind, which, for fulness of treatment, richness and wealth of illustration, and, withal, general readableness, has rarely if ever had its equal. The work will be completed in nine large octavo volumes, of which four are now issued, and will contain over three thousand engravings on wood, — for the greater part original, — one hundred and twenty colored plates, and twenty maps. The series really is composed of four separate works, which might find their places on the bookshelves of the geologist, botanist, anthropologist, and anatomist, dealing with man, individually and in general, plant-life, and geology in its widest sense. It is intended as a continuation of Brehm's 'Tierleben,' a work well known in itself, as well as from the numerous engravings borrowed from it in the recent English and American natural history works of a similar kind.

The published volume of the two papers on 'Erdgeschichte,' by Neumayr, deals with general physical, dynamical, and stratigraphic geology. 'Der Mensch,' by J. Ranke, treats of the embryology, development, anatomy, physiology, psychology, and zoölogical relations of man, and is followed by three volumes on 'Volkerkunde' by Ratzel. This latter part is especially full and interesting, and is richly illustrated by engravings, maps, and colored plates. Finally, the remaining two volumes, 'Pflanzenleben,' by Maxilaun, are to contain a general exposition of plant-life, structural, physiological, systematical, and economical, with forty colored plates.

The four volumes now published — 'Mensch,' 'Erdgeschichte,' and 'Volkerkunde' (two volumes) — fully bear out the promises of the publishers. The numerous engravings, colored plates, and the typography are excellent ; the descriptive matter readable, and for the most part interesting, and scientific. The style varies, of course, with the different authors, that of Professor Ranke being less clear and terse than that of either Professor Ratzel or Professor Neumayr. From the perusal of what has already appeared, the writer has found generally but little discussion of hypotheses, and, wherever critically examined, full and latest results of modern research. Of the general reliability of the work, the authors' reputations will afford sufficient evidence.

---

## *METHODS OF ARROW-RELEASE.*

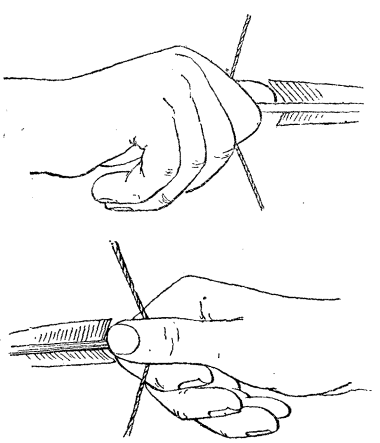
THIS substantial pamphlet, reprinted from the Bulletin of the Essex institute, October-December, 1885, is a noteworthy example of the thorough methods of modern archeological research. Professor Morse has laid under contribution not only narratives of travellers and explorers among the existing savage races, but all available records, graphic and other, of ancient times, to illustrate the manner of using the bow and arrow. This remarkable invention, as the late Lewis H. Morgan, in his well-known work on 'Ancient society,' has shown, did not make its appearance until mankind was well advanced in the savage state towards barbarism ; and it has survived to the present time among primitive peoples as the principal weapon of warfare and the chase. It is reasonable, therefore, to hope with our author that interesting results in tracing the affinities of ancient races may be derived from the minute study of the different ways in which it has been employed.

Professor Morse's attention was first directed to the subject by observing that his method of shooting was quite different from that of a Japanese friend : " In the English practice, the bow must be grasped with the firmness of a smith's vice ; in the Japanese, on the contrary, it is held as lightly as possible ; in both cases, however, it is held vertically, but in the English method the arrow rests on the left of the bow, while in the Japanese it is placed on the right. In the English practice a guard of leather must be worn on the inner and lower portion of the arm to receive the impact of the string ; in the Japanese no arm-guard is required. . . . In the English method the string is drawn with the tips of the first three fingers, the arrow being lightly held between the

*Ancient and modern methods of arrow-release.* By EDWARD S. MORSE. Salem, Bull. Essex inst. 8°.

first and second, the release being effected by simply straightening the fingers; in the Japanese the string is drawn back by the bent thumb, the forefinger aiding in holding the thumb down on the string."

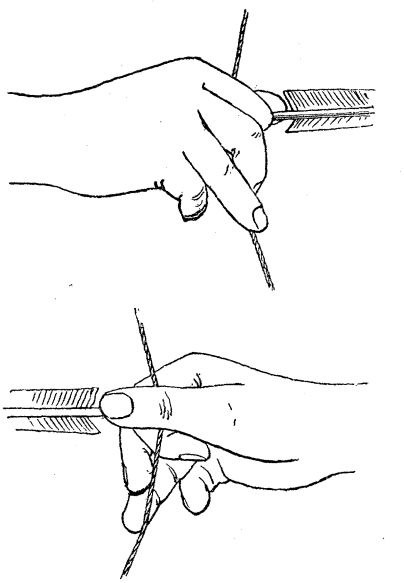
Thus set upon inquiry, he has discovered that there are, or have been, five different methods in vogue in the use of the bow and arrow. The simplest consists in "grasping the arrow between the end of the straightened thumb and the first and second joints of the bent forefinger. . . . With a light bow, such a release is the simplest and best; and it makes but little difference upon which side of the bow the arrow rests, provided the bow is held vertically. This release, however, prevents the drawing of a stiff bow, unless one possesses enormous strength in the fingers." He calls this the 'primary release.'



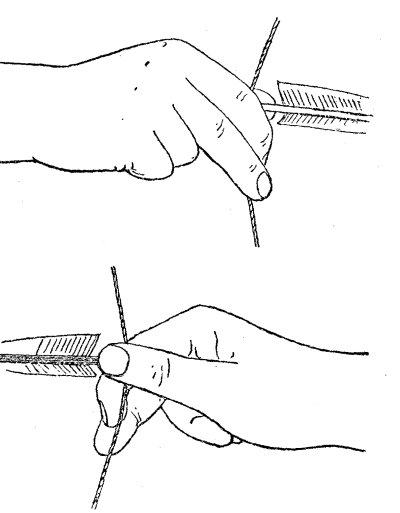
FIGS. 1 AND 2. — PRIMARY RELEASE.

It appears to have been the method used by the natives of this country, when first discovered, according to William Wood's quaint description: "For their shooting they be most desperate marksmen for a point blancke object . . . they can smite the swift-running Hinde and the nimble-winged Pigeon without a standing pause or left-eyed blinking; they draw their Arrowes between the fore finger and the thumbe; their bowes be quick, but not very strong, not killing above six or seven score" (*New England's prospect*, part ii. chap. xiv., Prince soc. ed., p. 97). Several of the American tribes still practise this method of release, and our readers have doubtless seen Indian boys shooting in this manner. This is also the habit followed by the Ainos, the primitive inhabitants of Japan.

The second manner of release "consists in grasping the arrow with the straightened thumb and bent forefinger, while the ends of the second and third fingers are brought to bear on the string to assist in drawing." This is an advance upon the first through the help afforded by the other fingers in drawing the string. This is designated as the 'secondary release,' and is stated to be the method employed by the Zuñis, the semi-civilized Pueblo tribe, living in the north-western part of New Mexico.



FIGS. 3 AND 4. — SECONDARY RELEASE.

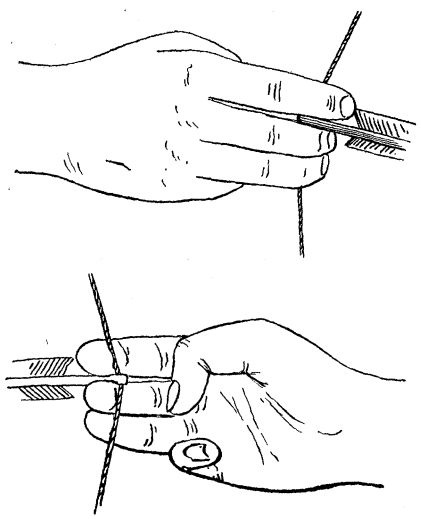


FIGS. 5 AND 6. — TERTIARY RELEASE.

The third method, which he styles the 'tertiary release,' "differs in the position of the forefinger,

which, instead of being bent and pressed against the arrow, is nearly straight, its tip, as well as the tip of the second and sometimes that of the third finger, engaging the string." This is the kind of release practised by most of the western tribes of this country.

"In holding the bow horizontally, the release-hand is held with the palm uppermost, the arrow, of course, resting on the bow, . . . but necessities arising, as in shooting in a forest, or shooting side by side with others closely appressed, the bow was required to be held vertically. In thus turning the bow-hand in the only



FIGS. 7 AND 8. — MEDITERRANEAN RELEASE.

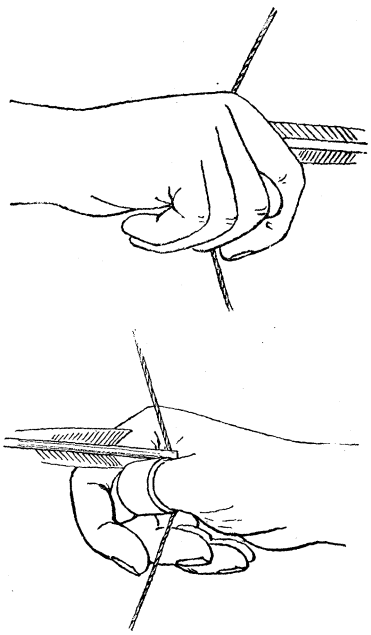
way it could be turned conveniently, the arrow would be brought to the left of the bow vertical. . . . In the primary and secondary releases, however, it makes but little difference on which side the arrow is placed; and some tribes, using the bow vertical, place the arrow to the right, and this is probably a quicker way of adjusting the arrow when shooting rapidly."

Professor Morse next considers a form of release "which by documentary evidence has been in vogue among the Mediterranean nations for centuries. It is the oldest release of which we have any knowledge. It is practised to-day by all modern English, French, and American archers, and is the one practised by European archers of the middle ages. It consists in drawing the string back with the tips of the first, second, and third fingers, the balls of the fingers clinging to the string, with the terminal joints of the fingers slightly flexed. The arrow is lightly held between the first and second fingers, the thumb straight and inactive."

Since it has been practised by the Mediterranean nations from early historic times, he very appropriately calls it the 'Mediterranean release.'

"This is unquestionably an advance on the others thus far described, as it enables the drawing of a stiffer bow, and is exceedingly delicate and smooth at the instant of loosing the arrow." It is quite remarkable that this method of release is practised by the Eskimo; which circumstance tends to confirm Prof. Boyd Dawkins's theory that this people is the direct representative of the cave-dwellers of southern France. The Eskimo are the only people known to Professor Morse, who have designed a distinct form of arrow for this method of release.

Finally Professor Morse proceeds to examine an entirely independent release, having no relation to the others. "In this the string is drawn by the flexed thumb bent over the string, the end of the forefinger assisting in holding the thumb in this position. The arrow is held at the junction of the thumb and forefinger, the base of the finger pressing the arrow against the bow. For this reason the arrow is always placed to the right of the bow vertical. This release is characteristic of the Asiatic races, such as the Manchu, Chinese, Kore-



FIGS. 9 AND 10. — MONGOLIAN RELEASE.

an, Japanese, Turk, and doubtless other cognate peoples."

As it is practised almost exclusively by Mongolian nations, he calls it the 'Mongolian release.'

In this release the thumb has to be protected by

some kind of a guard, which is generally a thick ring. "The releases vary in their efficiency and strength. The two strongest and perhaps equally powerful ones are the Mediterranean and Mongolian; and it is interesting to note the fact that the two great divisions of the human family who can claim a history, and who have been dominant in the affairs of mankind, are the Mediterranean nations and the Mongolians. For three or four thousand years, at least, each stock has had its peculiar arrow-release, and this has persisted through all the mutations of time to the present day. Language, manners, customs, religions, have in the course of centuries widely separated these two great divisions into nations. Side by side they have lived; devasting wars and wars of conquest have marked their contact; and yet the apparently trivial and simple act of releasing the arrow from the bow has remained unchanged. At the present moment the European and Asiatic archer, shooting now only for sport, practise each the release which characterized their remote ancestors."

We wish it were in our power to follow our author through his detailed investigations of the peculiarities in the use of the bow he has discovered in his truly marvellous study of the ancient monuments; but that is impossible. In a classified list he has given, under the heads of 'recent' and 'ancient,' all the tribes and nations who have practised the five different kinds of release described, and he concludes by begging for further information: —

"Travellers and explorers ought also not only to observe the simple fact that such and such people use bows and arrows, but they should accurately record, 1°, the attitude of the shaft-hand; 2°, whether the bow is held vertically or horizontally; 3°, whether the arrow is to the right or to the left of the bow vertical; and, 4°, whether extra arrows are held in the bow-hand or shaft-hand. The method of bracing the bow is of importance also. . . . Particularly does he desire to learn the release as practised by the Veddahs of Ceylon, the Hill tribes of India, the tribes of Africa, South America, and especially the Fuegans. Indeed, any information regarding the methods of arrow-release in any part of the world will be acceptable."

In answer to his inquiry, we venture the suggestion whether it is not possible that the so-called 'pierced tablets,' which are described and figured by Professor Rau (*Archeological collection of the Smithsonian institution*, p. 33) and other writers, and which have given rise to so much discussion among American antiquaries, may not have been guards worn to protect the wrist against the recoil of the bow-string. H. W. H.

## *THE BUTTERFLIES OF NORTH AMERICA.*

ONE welcomes an old friend more cordially than a new; so that when Mr. Edwards, after some hesitation, starts a third series of his renowned and incomparable illustrations of our native butterflies, begun twenty years ago, we are ready to render the full meed of praise for his unwearied energy, the success of his breeding experiments, and the more than liberal, almost profuse illustration with which they are published. When we know, in addition, that he has parted with a considerable portion of his unique collection to obtain means wherewith to launch this new series, we can only hope he will find a public properly appreciative of such zeal and sacrifice.

This first number is a reminiscence of the past. Two of the three plates represent hitherto unfigured species of that wonderfully prolific boreal genus Argynnis, one from Assiniboia, and the other from Utah and Arizona, with brief merely descriptive text — which remind us especially of his first series, where nearly seventy figures of this genus were given. The remaining plate gives not only the butterfly with its variations, but also all the earlier stages of our Californian species of Megonostoma (or, as Mr. Edwards prefers to class it, Colias), with many enlarged figures of minor details, accompanied by a tolerably full account of the insect — which recalls the more definitely biological character of the second series. To obtain the earlier stages, eggs were sent from California to West Virginia, and the caterpillars raised on an Amorpha, previously sent, in Mr. Edwards's garden.

The text is not so full or interesting as the later parts of the last series; but to say that the same care as before has been taken with the illustrations, whether in faithfulness of delineation to the last detail, or in truthfulness of coloring with an absence of all gaudiness, is quite enough. Nothing has ever surpassed them; they are a perfect model for such work. The same artists have been connected with the work almost from the first; and though the chief artist, Mrs. Peart, can no longer undertake the lithography with her own hand, they receive her careful supervision.

We can only congratulate naturalists on Mr. Edwards's determination to continue publishing on the same scale as before, and beg to remind them, that, but for this liberality, we should hardly have advanced in knowledge of the life-histories of our butterflies beyond what we knew when Boisduval and LeConte published their little octavo — a half-century ago.

*The butterflies of North America.* By W. H. EDWARDS. Third series. Part i. Boston, Houghton, Mifflin & Co. 4°.