

rosaria Pasti"), are moved with astonishment at the sight of a second crop of flowers on an apple-tree or a laburnum. Common as the phenomenon is, however, not many persons, even among botanists, bestow a thought as to how it is brought about. Gardeners recognise two distinct modes in which flowers may be produced, either from the "old wood," meaning the wood formed in the previous season, or from the shoot of the present year's growth. A rhododendron with its flowers packed up in a "winter-bud" destined to unfold in spring, an apple or a laburnum with their winter-buds at the ends of short contracted shoots or "spurs," afford illustrations of the one type, while a rose, with its newly-formed shoots crowned with one or more rose-buds, supplies an example of the latter. There is the same sort of difference between these two kinds of flowers that there is between the so-called "annual" plants whose course of life is outrun in a single season, and "herbaceous perennials" which die down in winter, leaving a winter-bud to carry on the work when circumstances become propitious in spring. The second growth of flowers in autumn may, therefore, be due to two different causes. In the one case it is an anticipation of spring; the flowers being produced afore time. Conditions of growth being persistently favourable, the winter-bud, instead of remaining dormant, bursts prematurely into growth, and repeats in autumn what its predecessor had done in spring. The great difficulty in such a case is to explain why one bud, or at any rate only a small proportion of the total number of buds, acts in this way when the circumstances of the case would appear to be substantially alike in all. To talk of the individuality of buds is to denote a fact which every observer must be conversant with, but which does not supply any explanation. In the second class of cases the flowers are, as in "hybrid perpetual" roses, placed at the ends of some of the shoots of the year. In this case gardeners have availed themselves of what was originally an occasional tendency to continue the development of flowers on the end of certain shoots, and have, as it were, converted an accidental into a constant occurrence. Doubtless they might do the same in the case of the laburnum, were they so disposed. It is here that the skill of the gardener comes in, and even enables him, to some extent, to baffle adverse climatic influence and induce a plant, as a regular thing, to flower twice in a season, or even more or less continuously, when, if left to itself it would either not do so at all, or only in a fitful, uncertain manner. It is worth notice, too, that these second blooms are often (but by no means invariably) malformed. Some rhododendrons now before me are so, while the double-flowered apples that one occasionally sees are always, in my experience, formed on the midsummer shoots of the tree. So, again, with pears, the second crop of flowers is usually produced on shoots of the year, and very generally the flowers are more or less imperfect or misshapen. The "Napoleon" pear behaves in this way every year. Every year, too, I am indebted to Mr. Burbidge, of the Trinity College Botanic Garden, Dublin, for specimens of "Bishop's Thumb" pears, produced on the summer shoots. These pears are more like fingers than thumbs, and are destitute of core. The flower-stalk swells up as usual, and produces an eatable pear, but the carpels and seeds are conspicuous by their absence. The developing force has been energetic enough to produce flower- and fruit-stalk, but it has failed in the more essential process of seed- and embryo-formation. Possibly in some cases the absence of seed may be the result of want of fertilisation. It may be that in the flowers some at least of the carpels are present with their contained ovules, but, owing to the want of effective fertilisation, they have dwindled away and left no trace.

It would be a curious and important matter to ascertain whether, and to what extent, this repeated flowering process exhausts the plant. If no seed were produced the

extra outlay of energy would probably not be severely felt. But every rose-grower knows how great are his losses, and how difficult it is to keep his "standards" in good form and good health. Of course there are many causes for this, but it is not unreasonable to suppose that one of them arises from exhaustion from continuous flowering, which produces a condition that predisposes to disease.

Another phenomenon of a somewhat similar character is very commonly met with this autumn, although, not unnaturally, it does not attract so much attention. I allude to the production of buds and leaf-shoots on the partially withered stems of herbaceous perennial plants, such as various species of *Epilobium*, *Malva*, &c. The branches of these plants usually dry up after flowering, leaving only a rosette of leaves or a winter-bud to carry on the growth next season; but occasionally they retain some amount of vitality, and, as at this season, produce a new generation of shoots from the old ones.

These variations show how artificial are the distinctions denoted by the terms annual, perennial, herbaceous, and the like, and they show what a wide range of physiological diversity may exist within the limits of the same species.

MAXWELL T. MASTERS

ARROW-RELEASE¹

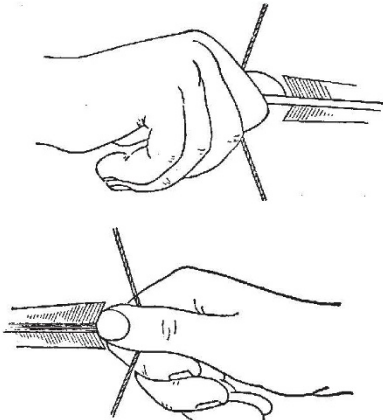
AT the commencement of this very interesting and instructive monograph, Prof. Morse tells us that when he began collecting data illustrating the various methods of releasing the arrow from the bow, as practised by different races, he was animated merely by curiosity; nor was it until he had accumulated quite a collection of sketches and other memoranda on the methods of arrow-release, not only of existing but of ancient races, as shown by frescoes and rock-sculptures, that he realised that even so trivial an art as that of releasing the arrow might possibly lead to interesting results in tracing the affinities of races. Hence he publishes in the present pamphlet the data which he has thus far collected, in the hope that further material may be secured for a more extended memoir on the subject. The great difference which Prof. Morse observed between the ordinary English and Japanese methods of using the bow first led him to investigate the subject, with the curious results to be presently narrated. The various forms of release, with their different modifications, are classified, and perhaps Prof. Morse's investigations may be most succinctly described by using his classification.

(1) *Ordinary Release*.—This is the simplest form of release, and is that which children all the world over naturally adopt in first using the bow. It consists in simply grasping the arrow between the end of the straightened thumb, and the first and second joints of the bent forefinger (Figs. 1 and 2). With a light or weak bow, says Prof. Morse, this release is the simplest and best; it makes little difference on which side of the bow the arrow rests, provided the bow is held vertically. On the other hand, however, a stiff bow cannot be drawn in this way, unless one possesses enormous strength in the fingers. This simple or primary release is that in use amongst the Ainos of Yezo, by the Demerara Indians, apparently also by the Utes. The Navajos employ it when shooting at prairie dogs, so that the arrow will not penetrate the ground if it misses its mark; so do the Chippewas. The Micmac Indians of the Cascapedia settlement, on the north shore of the Bay of Chaleur, used it, and it is said that the other tribes in this part of Canada draw the arrow in the same way. A member of the Penobscot tribe at Moosehead Lake, seemed incredulous when Prof.

¹ "Ancient and Modern Methods of Arrow-Release." By Edward S. Morse, Director Peabody Academy of Science. Essex Institute Bulletin, October-December, 1885.

Morse told him that there were other methods of drawing the arrow.

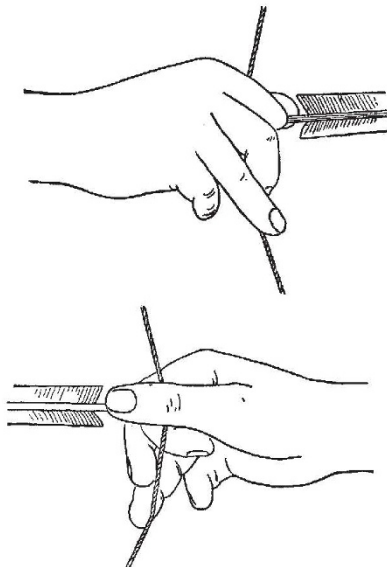
(2) *Secondary Release*.—This is a direct outgrowth from the primary release. It consists in grasping the arrow with the straightened thumb and bent forefinger, while the ends of the second and third fingers are brought to bear on the string to assist in drawing (Figs. 3 and 4).



Figs. 1&2. Primary release.

The Ottawas and Zuñi Indians practised this, as also did the Chippewas of Northern Wisconsin.

(3) The *Tertiary Release* differs little from the secondary. The forefinger, instead of being bent, is nearly straight, with its tip, as well as the tips of the second and third fingers, pressing or pulling on the string, the thumb, as in the primary and secondary release, active in assisting in pinching the arrow and pulling it back. This is used amongst various tribes of American Indians—Sioux, Araphees, Cheyenne, Assinboins, Comanches,

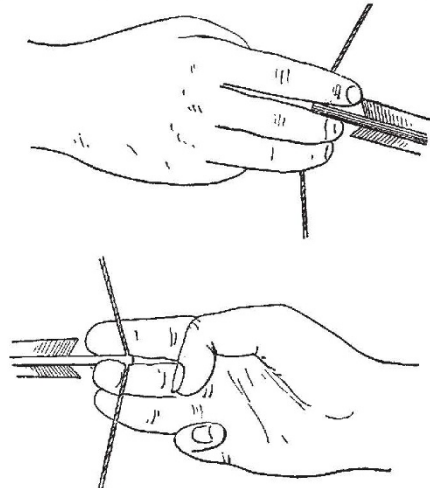


Figs. 3&4. Secondary release.

Crows, and Blackfeet. The Siamese, too, practise this release, with the difference that one finger only is used on the string instead of two. It appears, too, from Mr. Man's recent paper before the Anthropological Institute, that the Andaman Islanders use this method.

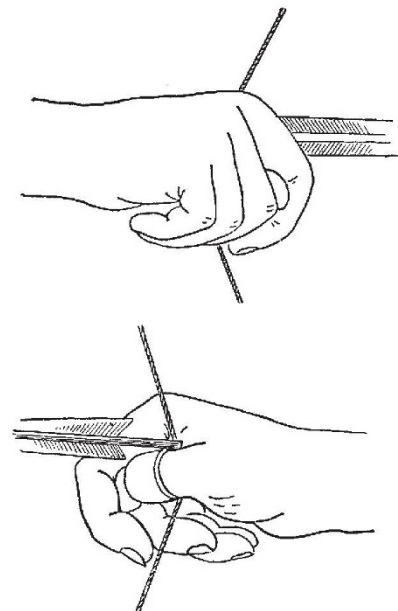
(4) *The Mediterranean Release*.—This release has been in vogue among the northern Mediterranean nations for

centuries, and among those of the southern Mediterranean for tens of centuries, and is the oldest release of which we have any knowledge. It is practised to-day, continues Prof. Morse, by all modern English, French, and American archers, and is the release used by the European archers of the Middle Ages. It consists in drawing the string back with the tips of the first, second,



Figs. 5&6. Mediterranean release

and third fingers, the balls of the fingers clinging to the string, with the terminal joints of the fingers slightly flexed. The arrow is held lightly between the first and second fingers, the thumb straight and inactive (Figs. 5 and 6). A leather glove or leather finger-strings are worn, as Roger Ascham expresses it in his "Toxophilus," published in 1584, "to save a man's fingers from hurtinge,



Figs. 7&8 Mongolian release.

that he may be able to bear the sharpe stringe to the uttermoste of his strengthe." In this release, the arrow must be to the left of the bow vertical. The Eskimo of Alaska employ this release, using, however, only the first and second fingers in drawing the string, and it appears to be almost universal in the Arctic regions.

These four releases may be considered, Prof. Morse

thinks, as successive modifications of each other; but the next release is an entirely independent form, having no relation to the other.

(5) *The Mongolian Release.*—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 position (Figs. 7 and 8). 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, Korean, Japanese, and Turk. The Persians also use it. The thumb is protected by a guard: the Manchus, Chinese, and others use a thick ring worn near the base of the thumb. It may be made of any hard material, such as horn, bone, ivory, quartz, agate, or jade. The Japanese archer uses a glove consisting of the thumb and two fingers.

These are the principal and most efficient forms of release, although doubtless there are others. Of the methods employed by ancient peoples, as represented in manuscripts, sculptures, &c., the Assyrians at one stage of their history appear to have used the primary form, while subsequently they used the secondary, and still later the Mediterranean release. The ancient Egyptians appear to have practised three, if not four, definite and distinct methods of release, but many of the representations in the old sculptures are evidently purely conventional, while some are clearly impossible. Following on these, Prof. Morse discusses the methods employed in ancient Greece, Persia, Japan, China, India, Mexico. Here he is naturally on less secure ground, for he has to endeavour to spell out a conclusion from various and conflicting positions of the hand in various ancient graphic representations of life amongst these peoples. The discussion involves a considerable amount of detail and numerous woodcuts by way of illustration, for which the reader must be referred to Prof. Morse's pamphlet. We must content ourselves with reproducing briefly his conclusions, which, it will be understood, are at present for the most part provisional, pending additional information and wider discussion. The persistence of a particular release in a people is well illustrated in the case of the Ainos. For centuries the Ainos have battled with the Japanese, and must have been mindful of the superior archery of their enemies; indeed, on all hands, with the exception possibly of the Kamchatdales to the north, the Ainos have been surrounded by races practising the Mongolian release, and yet have adhered to their primitive methods of shooting. The two strongest releases—both perhaps equally powerful—are the Mediterranean and Mongolian, and it is interesting to note 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 several thousands of years 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; devastating 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 characterised their remote ancestors. The following classified list shows in a general way that the primary, secondary, and tertiary releases are practised by savage races to-day, as well as by certain ancient civilised races, while the Mediterranean and Mongolian releases, though originating early in time, have always characterised the civilised and dominant races. The exceptions to this generalisation are curious: the Little Andaman Islanders practise the Mediterranean

release, and those of the Great Andamans the Tertiary; various groups of Eskimo practise the Mediterranean release, and have designed a distinct form of arrow for this method.

Primary Release.—Savage: Ainos, Demerara Indians, various North American tribes; civilised: early Assyrian, Egyptian, and Grecian (?)

Secondary Release.—Savage: some North American tribes; civilised: later Assyrian and Indian (?)

Tertiary Release.—Savage: North American tribes, Great Andamans; civilised: Siamese, Egyptian, Grecian, and Mexican (?)

Mediterranean Release.—Savage: Eskimo, Little Andamans; civilised: European nations now, and the archers of the Middle Ages, later Assyrian, early Egyptian, Arabian, Indian, and Roman.

Mongolian Release.—Manchus, Chinese, Koreans, Japanese, Turks, Persians, Scythians, Egyptians (?)

In conclusion, Prof. Morse expresses a belief that the method of using the bow may form another point in establishing or disproving relationships, in identifying the affinities of past races. Travellers and explorers should not content themselves with observing 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 horizontally or vertically; (3) whether the arrow is to the right or left of the bow vertical; and (4) whether the extra arrows are carried in the bow hand or shaft hand. The method of bracing the bow is of importance also. While anxious to get information respecting the arrow-releases of tribes and peoples, he is particularly desirous of hearing about those employed by the Veddahs of Ceylon, the hill-tribes of India, African tribes, and those of South America, especially the Fuegians. Such material, in the shape of descriptions, photographs, drawings, and if possible specimens of bows and arrows, may be sent to Prof. E. S. Morse, Peabody Academy of Science, Salem, Massachusetts, and will be acknowledged and used in a future publication on the subject.

CLIMATOLOGY OF THE CROYDON DISTRICT¹

IN a little tract of thirty-six pages, which has just appeared in the *Transactions* of the Croydon Microscopical and Natural History Club, Mr. Eaton has discussed the climatology of this part of England with a skill, clearness, and fairness seldom met with in local climatologies. The observations of temperature, which were conducted on the same systematic plan with Stevenson's screens, were made at seven stations, these being, in the order of their heights, Park Hill, Addiscombe, South Norwood, West Norwood, Waddon, Wallington, and Beddington. The periods selected for discussion are the five years 1881 to 1885 inclusive. The stations are included within an area measuring 4 miles from north-east to south-west by 2½ miles from south-east to north-west. The monthly results are given on fourteen pages with satisfactory fullness; and with them are conjoined, for the sake of comparison, the corresponding records of temperature at the Greenwich and Kew Observatories.

The heights and mean temperatures of the five stations from which observations are available for the whole of the five years are these:—Beddington, 102 feet, 48°·8; Waddon, 156 feet, 49°·0; South Norwood, 190 feet, 49°·4; Addiscombe, 202 feet, 49°·3; and Park Hill, 259 feet, 49°·4. —Park Hill, the highest station, being thus 0°·6 warmer than Beddington, the lowest station. This subversion of the general rule that the temperature diminishes with greater elevation is shown to be due to the frequency with which, on clear calm nights, the air in contact with the ground is cooled and rendered denser by radiation,

¹ "Report on the Temperature and the Rainfall of the Croydon District, 1881-85," by Henry Storks Eaton.