

THE INDO-CHINESE AND OCEANIC RACES—
TYPES AND AFFINITIES¹

IV.

HERE are the Raja of Gorontalo, N. Célèbes (Fig. 22), the chief of Sendegeassi, S. Nias, West Coast Sumatra (Fig. 23), and two natives of Jilolo (Fig. 24), all supposed to be more or less typical Malays whom it will be profitable to compare with Figs. 19, 20, 21, representing the Caucasian pre-Malay or Indonesian element in the Archipelago. In Fig. 25 we have Mohamed-Yamalal-Alam, Sultan of the Sulu Archipelago, who was compelled to accept Spanish supremacy in 1876. He is a pure Malay about thirty-four years old, like most of his subjects presenting a fine type far superior to that of the Malays of Malacca. Yet the Mongoloid element is unmistakably betrayed, especially in the high cheek-bones, presenting such a striking contrast to the regular European features of the Indonesians (see Figs. 19, 20, and 21). The portrait is from a photograph forwarded to France by MM. Montano and Rey, and originally published in *La Nature*, April 3, 1880.

But if we must speak with great hesitation and much reserve of a common Malay type, we can speak all the more confidently not only of a common Malay speech, but of a common "Malayo-Polynesian," and even of a common Indo-Pacific speech. Indeed the chief objection to the linguistic expression Malayo-Polynesian is that it is no longer sufficiently comprehensive. In the alternative Indo-Pacific, which, on the analogy of Indo-European, I have proposed as a substitute, the first component must be taken in two senses, so as to include both the Indian Ocean and a portion of Further India. When Fr. Müller wrote: "So much remains certain, and will never by the most brilliant and cogent reasonings be disproved: the Malayo-Polynesians are connected with no Asiatic people," he had in his mind not so much the "Malayo-Polynesian race" as the Malayo-Polynesian language. In this sense the statement was true enough according to his lights. In common with other eminent philologists he entirely overlooked Cambodian, or from insufficient data probably regarded it as a monosyllabic-toned language allied to the Indo-Chinese family. He consequently considered it as fundamentally distinct from the Malayo-Polynesian group, which is admittedly polysyllabic and untuned. But we have already seen in Section IV. that Cambodian or Khmêr is not a member of the Indo-Chinese family, and that it is polysyllabic and untuned, like all other known forms of speech. In the above-quoted paper "On the Indo-Chinese and Inter-Oceanic Races and Languages" (pp. 15-22) I further show that the true affinities of Khmêr are with the Malayo-Polynesian tongues, the whole forming a vast linguistic family stretching from Madagascar to Easter Island, west and east, from Hawaii to New Zealand, north and south, and with its basis still resting on the Indo-Chinese peninsula, where it originated, and whence it has been diffused throughout the Oceanic area with the migrations of the Mongolo-Caucasian races. Here it has long reigned supreme, continually encroaching upon and surrounding, as in so many detached enclaves, the diverse Negrito and Papuan tongues, but itself now threatened with extinction by the advancing Siamese and Annamese on the mainland, and by the still more aggressive English in Polynesia.

All the arguments establishing the intimate connection of the Cambodian and Malayan languages need not be repeated; but that based on the principle of modifying infixes has attracted so much attention, and is in itself so interesting, that the readers of NATURE will perhaps be glad to have it here resumed:—

"Common to the Khmêr and Malaysian tongues is one feature so peculiarly distinctive as of itself alone almost sufficient to establish their common origin. This is the use of identical infixes, which, though forming a

¹ Continued from p. 251.

marked characteristic of Khmêr, Malay, Javanese, Tagala, Malagasy, and other members of this group, has not yet been generally recognised. . . . The infixes in question are always the same, the liquids *m* and *n*, and even *mn*, with or without the connecting vowels *a*, *o* with *m*; *a*, *i* with *n*. Thus:—

IN KHMÊR: *m*, *am*, *om*, *mn*, *n*.

Slap, dead; samlap, to kill.
Sruöch, pointed; samruöch, to point.
Thleäk, to fall; tomleäk, to throw down.
Rolôm, to fall; romlom, to knock down.
Chereäp, to know; chumreäp, to show, teach, make known.
Kur, to draw; Komnur, a design.
Srek, to cry; samrek, a shout.
Chêk, to share; chamnek, a part or portion.
Sauk, to corrupt; samnauk, a bribe.
Pram, to publish; bamrap, a notice.
Pang, to wish; bamrang, a wish.
Rep, to confiscate; rombep, seizure, thing seized.
Ar, to saw; Anar, a saw.

IN MALAGASY: *in*, *om*.

Hanina, food; homana, to eat.
Tady, twisted, a rope; tomady, strong.
Taratra, glaring; tomaratra, transparent.
Safotra, overflowed; somafotra, brimful.
Sany, likeness; somany, like.
Safy, spying; somafy, sight of distant object.
Vidy and vinidy, bought.
Vaky and vinaky, broken.

IN MALAYSIAN: *um*, *âm*, *in*.*Javanese*.

Rayah, to bereave; rinaya, to be bereft.
Hurub, flame; humurub, to flame.
Balinbin, a small fruit; binalinbin, a round gem.

Tagala.

Basa, to read; bumasa, to make use of reading.
Kapatir, brother; kinapatir, brotherly.
Tapay, to knead; tinapay, bread.
Guntin, shears; gumuntin, to cut with shears.

Malay.

Palu, to beat; pâmalu, a club.
Pukul, to strike; pâmukul, a hammer.
Sipit, to grasp; sinipit, an anchor.
Padam, to extinguish; pâmadam, an extinguisher.
Pilih, to choose; pâmilihan, choice" (pp. 20-1).

This characteristic, of which nothing but the faintest echoes occur in any other linguistic system, is obviously one that is incapable of being borrowed, as prefixes and suffixes may occasionally be borrowed. Hence it must be regarded as an organic principle developed in the primitive speech before its differentiation into the various Oceanic branches, whose common origin seems thus to be established beyond question. The theory of such a remarkable feature being evolved independently at several points in this linguistic area and in no other cannot be seriously entertained.

Here therefore we have one type of speech everywhere common to two racial types, and the question arises, how all the Malayan peoples have come to speak exclusively polysyllabic untuned tongues, while their nearest kindred, the Mongoloid peoples of Indo-China, still speak exclusively monosyllabic toned languages. To explain this phenomenon we must remember that, as already pointed out, the polysyllabic-speaking Caucasians preceded the monosyllabic-speaking Mongols both in Farther India and in the Archipelago. Hence when the Mongols quitted the mainland they found the islands occupied by the Caucasians, with whom they amalgamated, and whose speech they adopted. Similar instances, though perhaps not on such a large scale, have occurred often enough elsewhere, even in historic times. Thus the Mongolo-Tatar Aimaks and Hazaras of North Afghanistan all now speak

Persian; the Ugro-Finnic Bulgarians have been Slavonised in speech since the tenth century; the Northmen of the Lower Seine valley entirely forgot their Norse tongue within two generations, and many of the early English settlers in Ireland rapidly became "Hiberniores ipsis Hibernicis," more Irish than the "Irishry" themselves. Special causes, arising from the utterly antagonistic nature of toned and untoned languages, must have accele-

language current in those islands and reduced to writing by the Buddhists at that remote period is as genuine a polysyllabic tongue as its modern representatives, Javanese, Sundanese, Madurese, and Balinese.

The eastern or Sawaiori branch differs greatly from the



FIG. 22.—Malayan Type, Celebes. King of Gorontalo.

rated the process of assimilation in Malaysia, where nevertheless its universality still remains a remarkable circumstance. For it is undoubtedly surprising that not a single Malay community should have succeeded in retaining its original monosyllabic speech, and still more surprising to find that every trace of monosyllabism had already disappeared, at least from Java, Madura, and Bali some two thousand years ago. The old Kawi



FIG. 23.—Malayan Type, Sumatra. Chief of Sendegeassi, Nias Island.

western or Malaysian, with which it has now really little in common beyond the fundamental elements. But these, after a separation of probably many thousand years, are still numerous enough to establish beyond all doubt their primeval unity. In this instance, however, as in so



FIG. 24.—Malayan Types, Jilolo. Mother and Daughter, Dodinga.

many others, community of speech in no way involves community of descent, for we have just seen that the language now spoken by the Malay races was in all probability imposed upon them by their Caucasian predecessors in the Archipelago. On the other hand there

is no reason to suppose that the Eastern Polynesians ever spoke any other than their present language, its resemblance to the Malay being due not to their relationship with the Malay people, but with the Indonesian Caucasians, from whom the Malays borrowed their speech.

Like the other members of the family Sawaiori is agglutinating, but it occupies a very primitive or undeveloped position in that order of speech. Thus it betrays very slight traces of the infix principle, but it possesses as a prefix the same particle *ma*, which in Cambodian and its Malaysian congeners appears as an infix. In Samoan, for instance, *fai* = to do, but *mafai* = to be able; *sasa'a* = to spill, *masa'a* = spilt; *liligi* = to pour out, *maligi* = to be poured out; *fasi* = to split, *mafasi* = to be split off; *fati* = to break, *mafati* = to be easily broken; *fola* = to spread out, *mafola* = to be spread out; *gaegae* = to shake, *māgaegae* = to be loose; *goto* = to sink, *magoto* = to be sunk or waterlogged, and so on, generally in an intransitive or passive sense.

But the chief peculiarity of the Sawaiori tongues is their extremely simple phonetic system, comprising no more than fifteen letters (five vowels and ten consonants), with no closed syllables or combinations of two or more consonants without an intervening vowel. Hence the strange forms assumed by English and other European words in the mouths of the natives. When he visited Tahiti in 1769 to observe the transit of Venus, Cook tells us that "after great pains they found it utterly impossible to teach the Indians to pronounce their names. . . . They called Capt. Cook, Toote; Mr. Hicks, Hete; Molineux they renounced in absolute despair, and called the master Boba, from his Christian name Robert; Mr. Gore was Toarro; Dr. Solander, Torano; and Mr. Banks, Tapanē; Mr. Green, Eteree; Mr. Parkinson Patini; Mr. Sporing, Polini; Petersgill, Peterodero; and in this manner they had now formed names for almost every man in the ship" (*First Voyage*).

To resume: in the Indo-Chinese and Oceanic regions we have altogether five distinct types—three dark (Negrito, Papuan, and Austral, with the doubtful Tasmanian), one yellow (Mongolian), and one brown (Caucasian). These, with their various ramifications and interminglings, give the seven main divisions of our scheme, which may now be expanded and complemented as under. Here, for reasons fully specified, the familiar term "Malayo-Polynesian" disappears, and Malay itself sinks to the position of a variety of the Mongolian type. Although grouped with the Oceanic branch of this division, it should be noted that the Malays also occupy most of the peninsula of Malacca. But they seem to be intruders in this region, the true aborigines of which are the Negrito Samangs, and in any case their real home in historic times is the Eastern Archipelago.

A.—DARK TYPES

- I. NEGRITO.—Aetas of the Philippines; Andamanese Islanders; Samangs of Malacca; Kalangs of Java; Karons of New Guinea.
- II. PAPUAN.—1. *Central Branch*: Papuans proper of New Guinea and adjacent islands, Mafors, Arfaks, Koiari, Koitapu, Waigiu, Aru, Salwatty, Mysol, Gebi, &c. 2. *Eastern Branch*: Sub-Papuans East (Melanesians), Admiralty, Louisiade, New Britain, New Ireland, Solomon Islands, New Hebrides, Loyalty, New Caledonia, Fiji. 3. *Western Branch*: Sub-Papuan, West ("Alfuros"): Floris, Ceram, Buru, Timor, Parts of Gilolo, Banda, Kissa, Savu, &c.
- III. AUSTRAL.—Australians, Tasmanians (?).

B.—CAUCASIAN TYPES (Fair and Brown)

- IV. CONTINENTAL BRANCH.—Khmer or Cambodian Group: Khmers proper, Khmêrdom, Charay, Stieng, Cham, Banhar, Xong, Khang, &c.
- V. OCEANIC BRANCH.—Indonesian Group: Battas of Sumatra, Dyaks of Borneo and Celebes, some "Alfuros" of Ceram and Gilolo, Mentāwey Islanders. Sawaiori or Eastern Polynesian Group: Samoa, Tonga, Tahiti, Marquesas, Tuamotu, Maori, Hawaii, Tokelau, Ellice.



FIG. 25.—Malayan Type, Sulu Islands. The present Sultan of Sulu.

C.—MONGOLIAN TYPES (Yellow and Olive Brown)

- VI. CONTINENTAL BRANCH.—Indo-Chinese Group: Chinese, Annamese, Tibeto-Burmese, Thai (Siamese, Laos, Shan, Khamti), Khasia, Khyen, Karen, Kuki, Naga, Ahom, Mishmi, Bhod.
- VII. OCEANIC BRANCH.—Malayan Groups: Malays Proper, Javanese, Sundanese, Madurese, Balinese, Macassar, Bugi; Malagasy of Madagascar; Tagalo-Bisayans of Philippines; Formosan Islanders; Mikronesians (Pelew, Carolines, Ladrões, Marshall, Gilbert Islands).

It thus appears that the three great divisions of mankind (A, B and C) are in possession of an ethnical region which some anthropologists have regarded as the

cradle of the human race. Observing that the anthropoid apes of equatorial Africa—gorilla and chimpanzee—are dolichocephalous, while those of Malaysia—orang-utan and gibbon—are brachycephalous, certain polygenists have suggested that the former may be the progenitors of the dolichocephalous Negroes, the latter of the brachycephalous Negritos. But we have seen that the Papuans of the extreme east (New Hebrides, Fiji, &c.) are also dolichocephalous, and even of a more pronounced type than the natives of Sudan. On the other hand, the Obongos, Akkas, and other pigmy tribes of Central Africa appear to be brachycephalous,¹ so that the theory fails at both extremes, Fiji and the Gaboon. Assuming however that mankind may have been evolved in the Eastern Archipelago or in some now submerged adjacent lands, and bearing in mind the relative value attached to the idea of race, as implied in our definition of species, the present conditions might still admit of explanation. In the Andamanese Islanders, whom Prof. Flower justly regards as of an "infantile type," and in the Javanese Kalong, whose features von Rosenberg describes as the most decidedly ape-like he had ever seen, we would have still *in situ* the earliest extant representatives of primeval man. Migrating westwards across a now lost "Lemuria," this primitive Negrito race may have reached equatorial Africa, where it is still represented by Du Chaillu's Obongo, Lenz's Abongo or Akoa, Schweinfurth's Akka, and where it may under more favourable conditions have become differentiated into the Negro of Sudan. Migrating eastwards across a continent of which the South Sea Islands are a remnant, the same Negritos may have similarly become slowly differentiated into the present Papuan or Melanesian peoples of those islands. Migrating northwards, before the severance of the Archipelago from the mainland, they reached Malacca and the Deccan, where they may still be represented by the Maravans and other low castes of that region. Moving thence over the Asiatic continent, they became under more temperate climes differentiated, first probably into the yellow Mongol, and then through it into the fair Caucasian type. But however this be, the subsequent migrations of the Mongols and Caucasians to the Archipelago, as above set forth, was probably, after all, but a return under new forms to their old homes. Here their mutual interminglings have again evolved fresh types and sub-types, producing a chaos of races whose true affinities I have endeavoured in these papers to elucidate, while fully sensible that in all such inquiries the last word still must be, *felix qui potuit rerum cognoscere causas*.

A. H. KEANE

THE PHOTOPHONE

THE following calculation, made with the view of examining whether the remarkable phenomena recently discovered by Prof. Bell could be explained on recognised principles may interest the readers of NATURE. I refer to the *un-electrical* sounds produced by the simple impact of intermittent radiation upon thin plates of various substances.

It has been thought by some that in order that a body exposed to variable radiation may experience a sensible fluctuation of temperature its rate of cooling must be rapid. This however is a mistake. The variable radiation may be divided into two parts—a constant part, and a periodic part—and each of these act independently. Under the influence of the constant part the temperature of the body will rise until the loss of heat by radiation and conduction balances the steady inflow; but this is not appreciable by the ear, and may for the present purpose be left out of

¹ The Akkas certainly; but Lenz seems to think that the Abongos are dolichocephalous, so that this point remains still to be settled. Dr. Barnard Davis however in his *Thesaurus Craniorum* recognises brachycephaly in equatorial Africa, four out of eighteen skulls in his collection from this region being distinctly brachycephalous.

account. The question is as to what is the effect of the periodic part of the whole radiation, that is, of a periodic communication and *abstraction* of heat which leaves the mean temperature unaltered. It is not difficult to see that if the radiating power of the body were sufficiently high, the resulting fluctuation of temperature would diminish to any extent, and that what is wanted in order to obtain a considerable fluctuation of temperature is a *slow* rate of cooling in consequence of radiation or convection.

If θ denote the temperature at time t , reckoned from the mean temperature as zero, q be the rate of cooling, $E \cos \phi t$ the measure of the heating effect of the incident radiation, the equation regulating the fluctuation of temperature is—

$$\frac{d\theta}{dt} + q\theta = E \cos \phi t.$$

Thus—

$$\theta = \frac{E \cos(\phi t + \epsilon)}{\sqrt{\{p^2 + q^2\}}},$$

showing that if ϕ and E be given, θ varies most when $q = 0$.

Let us suppose now that intermittent sunlight falls upon a plate of solid matter. If the plate be transparent, or absorb only a small fraction of the radiation, little sonorous effect will be produced, not merely because the radiation transmitted is lost, but because the heating due to the remainder is nearly uniform throughout the substance. In order that the plate may bend, as great a difference of temperature as possible must be established between its sides, and for this purpose the radiation should be absorbed within a distance of the order of half the thickness of the plate. If the absorption be still more rapid, it would appear that the thickness of the plate may be diminished with advantage, unless heat conduction in the plate itself interferes. The numerical calculation relates to a plate of iron of thickness d . It is supposed that q is negligible in comparison with ϕ , *i.e.* that no sensible gain or loss of heat occurs in the period of the intermittence, due to the fluctuations of temperature themselves.

If the posterior surface remains unextended the extension of the anterior surface corresponding to a curvature ρ^{-1} is $\frac{d}{\rho}$, and the average extension is $\frac{d}{2\rho}$. Let us inquire what degree of curvature will be produced by the absorption of sunlight during a time t , on the supposition that the absorption is distributed throughout the substance of the plate, so as to give the right proportional extension to every stratum.

If Ht denote the heat received in time t per unit area, c the specific heat of the material per unit volume, e the linear extension of the material per degree centigrade, then

$$\frac{1}{\rho} = \frac{2eHt}{c \cdot d^2}.$$

In the case of sunshine, which is said to be capable of melting 100 feet of ice per annum, we have approximately in *C. G. S* measure

$$Ht = \cdot 008 t.$$

$$\text{Thus } \frac{1}{\rho} = \cdot 016 \frac{et}{cd^2}.$$

For iron $e = \cdot 000012$, $c = \cdot 86$.

Thus if $t = \frac{1}{5}$ (of a second), $d = \cdot 02$ cents.

$$\frac{1}{\rho} = 1 \cdot 12 \times 10^{-6}.$$

This estimate will apply roughly to a period of intermittence equal to $\frac{1}{5}$ th of a second, *i.e.* to about the middle of the musical scale. If the plate be a disk of radius r , held at the circumference, the displacement at