

*Germans.* Another group in the final stage of assimilation, about 1,000 registrations representing over 8,000 settlers, with group settlements of last century at Hokitika, Nelson, Halcombe. Immigration ceased in 1914.

*Italians.* About 1,000 peasants from Venezia, the Bay of Naples, Potenza, and Stromboli, who form groups in Runanga, Nelson, and the Wellington district. Beginning before 1900, immigration reached a maximum in 1925, the total being perhaps 2,500. Market gardening groups are better settled than the fishermen, restaurateurs and miners.

*Yugoslavs.* A total immigration of perhaps 10,000 from the district of Split in central Dalmatia. Present registrations 1,200, to which should be added 4,000 naturalized and native-born. Older settlers, many of them formerly gumdiggers, have farms between Awanui and the Hauraki Plains; newer arrivals are labourers and restaurateurs. Immigration began before 1890 and ran strongly between the wars. The Tito movement has raised questions of political adherence.

*European Refugees.* About 1,000 persons, mainly of Jewish associations. There is the assimilating West European type, possessing more or less marked German, Austrian or Hungarian national characteristics, and the non-assimilating type from East Europe, especially Poland; in our environment each type has its own problem of adaptation. Being urban people of high education, refugees represent the first alien group ever to claim leading positions in the country, and despite original unsuitability in many respects, their cultural and economic achievement is notable.

*Less Numerous Groups.* The 320 Swiss registrations represent a small but regular peasant immigration from eastern cantons to Taranaki. They become dairy farmers, as do also a smaller group of Swedish-speaking Finns. In the last century there was a Hungarian settlement at Tuatapere, and a Czech settlement at Puhoi; both are now completely assimilated. Apart from a few White Russian emigrés there is only Jewish immigration from Russia and Poland. The 150 registered Greeks are peasants from Mitylene and Kephalaria who have become successful restaurateurs.

#### *Conclusion.*

In 1884 one person in every 25 was of foreign birth; to-day the ratio is one to 106. The anti-alien feeling of recent years is to be ascribed, not to any increase of alien groups, but to the recent appearance of a small but conspicuous urban group of high capacity. Whatever be the interpretation in terms of social psychology, the situation obviously demands the regeneration of the shrunken capacity of our community for incorporating foreigners and their culture.

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## THE MECHANISM OF VOICE PRODUCTION

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THE basis of speech is phonation; phonation is the production of sound by the two vocal cords in the larynx. These cords are placed horizontally behind the middle point of the thyroid cartilage commonly called Adam's Apple.

The varying vowel sounds and consonants are developed in the mouth, depending on the size of the oral cavity, the position of the lips, the shape, tone and position of the tongue and the movements and position of the soft palate.

The normal production of sound, i.e., phonation, is brought about by the setting up of vibrations in the two vocal cords. The sound produced is inaudible to the ear, but it becomes audible when that sound is amplified in a resonating chamber or tube. In an organ-pipe there is one reed which is set in vibration by a steady blast of air. The sound is made audible by the column of air in the organ-pipe taking up, or resonating to the vibrations of the reed. The cavity of the larynx above the two cords in the pharyngeal tube, which extends to the base of the skull, act together as a resonator and amplifier of the sound produced by the vibrating cords.

In the case of the organ-pipe only one foundation-note or its overtones can be amplified and rendered audible to the human ear. The amplifying column of air in the larynx can resonate to all vibration times from about 50

cycles per second to about 2,000 or 3,000 cycles per second. This is done by varying the length and shape of the tube. The variation is carried out by elevator and depressor muscles of the larynx and muscles surrounding the superior larynx and the pharynx which narrow the tube. Complete relaxation gives us the widest state of the tube, while relaxation of the elevators and contraction of the depressors give us the greatest length. The longer the resonating column of air and the greater its cross section the lower the note amplified. When a high note is being uttered the larynx (Adam's Apple) can be felt being pulled up.

How do the cords produce the varying pitches? With a violin string the screw fixes the normal or basic note. The pitch rises by fingering. In the larynx the crico-thyroid muscles together contract, tilt the thyroid cartilage downward in front towards the fixed point the cricoid cartilage, and so put the cords into tension for the basic note for the individual.

On the lateral borders of the cords are groups of tiny muscles called the internal thyro-arytenoid muscles, which act like the fingers of a violinist. These are fixed posteriorly and extend anteriorly one after the other towards definite points of the cords. They do not extend as far as the attachment of the cord to the inner aspect of the thyroid cartilage but stop short at or near the junction of the middle and anterior thirds of the cords. Beginning posteriorly, these tiny muscle bundles pull on the cords and dampen the part between their posterior attachment to the vocal processes of the arytenoid cartilages and the point of dampening. Thus the free portions anteriorly alone can be set in vibration, giving us a gradually rising pitch as the muscle bundles contract. There is therefore a limit to the upper range possible by this fingering or dampening. All larynges are not alike. In some the muscle bundles extend further forwards than in the others. Sopranos and tenors have more of these muscle bundles than contraltos and basses. The variation of these bundles produces the different types of singers.

When a tenor strives to reach a higher note than is natural to his larynx he has to tighten his cords by over-contraction of the large crico-thyroid muscles, the sole function of which should be to put the cords in tension as the screw of the violin does to the string. Tightening of the cord does not rapidly, or to any extent, raise the pitch. When this over-stretching is done the strain can be seen in sympathetic contraction of the facial muscles. Further, the blast of air required to make the over-tightened cords vibrate is correspondingly increased. This can be seen by the enlargement of the chest which occurs by bringing into play the extraordinary muscles of respiration, the pectoral muscles and the elevators of the chest. You will notice in such cases the raising of the shoulders. All that is required normally for a loud note is obtained by greater depression of the diaphragm and greater action of the intercostal muscles, the natural enlarging mechanism of the chest in inspiration.

The unnatural stretching of the cords and the extra blast of air required for setting them in vibration frequently end in damage to the cords. Singers' nodes are produced by the rupture of the fine fibres of the cords at their edges. If such a singer wishes to reach a still higher pitch a peculiar phenomenon occurs. The cords are not completely dampened by the loose and muscular false cords being forced down on to the upper surface of the cords. This turns the sound-producing larynx into a flue-pipe instead of a reed-pipe. The space between the false cords and the true cords is obliterated. As the air-space is put of the resonating and amplifying apparatus the character of the note changes. This character is known as falsetto. Watching such a singer, one sees the sense of strain disappear. The falsetto range is a small one and its variations are not so numerous as when the reed-like apparatus is functioning.

Straining is seen not only in singers; it is seen often in public speakers and in those who scream at children or their neighbours. Singers' nodes are often found in such people.

These are not the only faults to be found. Before tension is put on the cords these have to be brought into apposition by the closing muscles of the larynx; these are the lateral crico-arytenoid muscles and the transverse inter-arytenoid muscles. All these must act in harmony and that harmony is determined by nerve impulses from the brain. Sometimes the posterior muscles, the inter-arytenoid muscles, do not contract well and there is left a gap in

the posterior third of the glottic chink. There is therefore an escape of air and that gives a peculiar wheeze to the voice. The tips of the vocal processes come together not in a parallel direction, but inwards. This produces rubbing with the resultant contact ulcers which give a harsh and hoarse tone to the voice.

The actual production of the voice or speech as we know it is in the mouth. This production is in the province of the elocutionists. Shut the lips and set the cords in motion and a humming sound rising in the scale is produced, but it is of a uniform character or timbre. The different vowel and consonant sounds are formed in the mouth.

But what gives character to different voices so that they can be distinguished from one another? Just as the conductor of an orchestra can distinguish between each instrument and even between each first violin because each has its own character or timbre, so we distinguish voices. The timbre depends on the make-up of the resonating chambers. Each resonating chamber has its own vibration times. The violin has its wood, its varnish, its air space, its gut, and the fibres of the bow. These vibrating times are never alike in two violins made even by the same man. The intrinsic vibration times are all among the overtones and harmonics—i.e., in the higher pitches. The listener, with advancing perceptible deafness, loses his power of detection of these higher frequencies and consequently his ability to differentiate between musical instruments and human voices.

For the production in the human being of sound of a pleasing quality it is essential that proper instruction be given. Evenness of muscular contraction, easy sustained action with lack of forcing is essential to produce a pleasant sound and to prevent tiring and damage when much is required of the singer and speaker. Pathological changes in the sound mechanism do cause trouble, but most objectionable features come from mimicry, carelessness, and self-consciousness.

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## ABSTRACTS AND TITLES

### PSYCHOLOGY SUB-SECTION

#### *Trusteeship and Self Government in New Zealand Pacific Dependencies.*

By ERNEST BEAGLEHOLE, Victoria College.

This paper has been published in the *Journal of the Polynesian Society*.

#### *The Organization of Scientific Research in the United States and Canada.*

By N. A. MARRIS, Dept. S.I.R., Wellington.

The paper gave an outline of the Research Establishments in both the United States and Canada, of the Federal Governments, Universities, Private Research Institutes and Industry. Reference was made to their establishment and organization and, in general terms, to their research programmes.

#### *The Ainu People of Northern Japan.*

By I. L. G. SUTHERLAND, Canterbury College.

A visit recently paid to the Ainu people of Hokkaido, northern Japan, at the invitation of the American occupying authorities was described. Japanese university professors gave much assistance in making contacts in the Ainu villages. The object of the visit was to observe as much as possible of the present condition of the Ainu people. They are the aboriginal people of what is now Japan and their origin and racial affinities are still undetermined. Their physical make-up and their culture have aroused special interest among anthropologists.