SINGING DISABILITY.

In an effort to discover the causes of, and a cure for singing disability, seventy-nine children and two adults were observed and given treatment between 1939 and the present time. Fifty of them were given various tests to this end, records being kept. Fifty-three were cured, five left the district, fifteen are still having lessons, and eight were improved but not cured, though it now seems that they might have been.

The main cause was slower learning than normal, due to the absence of singing at home, or a lack of interest which often went with lower musical intelligence. Slower learning, as a rule, only presented difficulty where it had been the subject of comment or criticism, and where the child had not been allowed to try to sing. The mental attitude thus created was a factor in almost every case. Occasionally the cause was an affection of the ear, nose, or throat; though hardness of hearing was scarcely ever the sole reason for the trouble. In a few instances it was due to a slight fault in the vocal organs; and in others, to bad production of the voice. In no case was it due to an abnormally low register; and tone deafness was found to be non-existent. In order to remedy the defect the child was helped to locate notes, then persuaded to sing ascending scales, and also

made to attempt to sing songs of a very easy type. The vowel sound 'loo' frequently, but not exclusively used, was found to be a splendid corrective of bad voice-production. Constant encouragement was given; and great patience and determination were necessary. The good results of the work were evident in the increased interest in musical activities, and in the general enthusiasm of those who had been taught to sing.

SINGING DISABILITY IN SCHOOL CHILDREN.

Chapter 1

THE PROBLEM OF SINGING DISABILITY AND ITS HISTORY.

In almost all school singing classes it is possible to find one or two individuals, sometimes more, who cannot sing like the others, but who progress through the songs with little or no variation in pitch, and who seem to be incapable of following even the simplest tune. They are usually said to be 'tone deaf'; and names such as 'grunter', 'growler', or 'drone' are applied to them. Until quite recently it was the almost universal custom to forbid any attempt at singing by them; and very frequently they were allowed either to read or to do work of some other kind, on the grounds that it was useless for them to try to sing, and that if they did, they would only succeed in distracting the attention of the normal singers. In recent years, the beginnings of a change of attitude have been evident, though even to-day it is safe to say that the vast majority of these children are prevented from trying to sing at school; and, as a result, they are deprived of one of life's greatest pleasures, and usually, too, of any musical culture. In people of normal intelligence, and especially in those who are artistic by nature, it is a serious loss which can cast its shadow on the whole of a person's life.

The present inquiry was really begun in 1939 with an attempt to see whether such a person could be trained to sing, even a little, and to discover whether there was any truth in the popular idea that the defect was analogous with colour blindness in vision. All the entrants to Acklam Hall Grammar School are, on arrival, given two simple voice tests to determine the quality of their voices. They are, first of all, asked to sing simple ascending scales, beginning usually at Middle C, the tonics moving by step to the G, A, or B above Middle C. A record is kept of the quality of the voice, and the goodness or otherwise of the production. This test is followed by the playing of single notes in different parts of the normal voice range in order to try out the boy's ability to locate sounds. Most boys perform these tests quite satisfactorily, though there are, of course, the usual differences of range, power, quality, and acquired skill in production. The non-singers are, as a rule, defeated by the ascending scales, though not invariably, and the test of location is necessary to ensure that a defective singer is not missed. As a result of these tests a good estimate of each boy's vocal ability is gained. One boy who began to attend the school in that year proved to have only a small range of notes, and to be quite unable to sing any note which was played, certainly not any tune. Up to that time, boys who had been found to

be non-singers had always been told to try to sing, and there the matter had been left. There had been no noticeable improvement in any instance, though written records had not, of course, been kept of their progress or otherwise. This particular boy was taken to the piano at the commencement of his second music lesson at the school. He was not at all nervous; and did not mind making his attempts at singing in front of the other members of his class. At first he failed to locate even Middle C. When he had tried several times, unsuccessfully, to do this, a new approach was made; he was asked to sing any note he was able, and this was played firmly, several times, while he was still singing it. This was repeated a number of times. The next step was taken in the following lesson. Again the note was provided by the boy himself and he was made to try to sing up the scale, step by step. He was partly successful. Great effort on his part was needed, and much exhortation on mine. After a further three or four lessons he could locate any of the notes near to Middle C; and before long could sing up the scale accurately. When descending scales were attempted it was found that he could not at first do these at all satisfactorily, but tended to 'collapse' and miss out notes. This was corrected by practice and the next step was the attempt to sing tunes. A folk song which the class had recently learnt was the

first, the title being, "A Farmer's Son so Sweet". His first attempts were made to the syllable 'lah' and were not very successful; but little by little he improved, and was ultimately able to do it fairly well. Other folk songs were now begun and steady progress was made with them. This was followed by an attempt to sing the first verses of the songs. A tendency to 'talk' the verses had to be checked, and he needed much encouragement at this stage; but he improved steadily and soon was able to sing them with only occasional lapses. The greater part of a year had now passed and he seemed to be almost cured. The quality of his voice was pleasant; he sang with ease up to B^2 flat; and he had almost, but not quite, mastered several folk songs. There was still the occasional lapse, however. At the beginning of the summer holiday of 1940 he went, without my knowledge, and applied for permission to join a church choir, passed the voice tests, and was accepted. When he recommenced school in the Autumn term he was completely cured of his defect; the regular singing in the choir had rounded off the year's work. He was tested on several occasions, as time went on; but showed no sign of regression. It was, however, discovered later that he droned when doing sight-singing exercises with the class; but this disappeared in the course of time, and it did not in any case affect his singing with his class when

songs were being rehearsed. The instruction had, all this time, taken place at the beginning of each music lesson, of which his form had two per week.

The work thus begun was continued with considerable, though not invariable, success. A number of defective voices of various kinds was treated, though the children were now given their singing instruction after school, and not during lesson time. The reasons for this change are obvious: not only would a disproportionate amount of time have been allotted to lessons for a small minority of the class, whilst the large majority would have been wasting their time; but the more sensitive members of the vocally defective group would have found it difficult, if not quite impossible, to attempt to sing corrective exercises and songs in front of their fellows. Small groups of non-singers were taken together, though individually, and not as a class; and it was found that, except in one or two instances, there was never any objection to singing in front of other boys of the same group.

In January 1943 the results so far obtained were described in 'The Times Educational Supplement', in an article entitled 'Tone Deafness: Results of an Experiment'[11]. As far as was known this was the first published account of any research into the condition, though it was later discovered that Mrs Curwen had referred to it, and had suggested a

treatment for it, in 'The Teacher's Guide to Mrs Curwen's Pianoforte Method', pages 307 to 317, chapters I and II of Section VI which is on 'Ear Training'(2).

In this section of her excellent book she suggests that children may be divided roughly into three classes:

(1) Those who have had musical surroundings from babyhood, who have sung as soon as they have talked, and in whom the sense of tune and the sense of time are fairly equally developed;

(2) Those who have not much control of the voice; who can sing a little, not always in tune, and who while not destitute of a sense of pitch, have usually a stronger sense of rhythm; and

(3) Those 'in whom the sense of pitch seems altogether wanting - who cannot imitate a sound or tell whether a series of sounds goes up or down. These are often the children of unmusical parents, who are usually the most keenly anxious that their children should be musical.'

Her method of training was to give ear and voice exercises in each lesson. Two dohs would be written, one high and one low. The teacher would sing each of them several times and point to the correct ones on the paper as she did so. Then the child would be asked to do the pointing. Next he would be asked to sing a note played on the piano. If he failed, but sounded some other note, this was called 'doh'.

From this he was led to attempt the first three, then the first five notes of the scale. Leaps of an octave, and then of a fourth and fifth, were later tried; and in this way he proceeded to the singing of simple exercises. Tonic Solfa was the basis of her method. She makes this comment,

'Do not worry the child, and give praise for the slightest improvement. A child who has had his lack of musical ear freely commented on in his presence - a rudeness we allow ourselves because he is "only a child" - needs a great deal of encouragement if we would have him make an effort to do that which he has always been given to understand he could not do.'

She does not produce any evidence; and to judge from observation, her advice has seldom, or never, been followed.

Later still, a reference to vocal disability was found in 'A Manual of Music' by R. Dunstan(5). At the end of the book is quoted the section of 'The Board of Education Suggestions' for 1914 which deals with the teaching of singing. In section 23 of the 'Suggestions' on page 270 of the book, occur these words

'Children who "drone" or who cannot sing in tune may be put by the side of children who sing well and told to listen and try to imitate; on some occasions they may be

told to listen only, though the teacher should avoid discouraging them. Their voices should be tried from time to time, and as the power of singing develops (as will occur in the majority of cases), they may be allowed to sing (with) the rest. The very few children who are eventually found to be tone-deaf should not sing at all; but long and patient trial is often necessary before it is finally decided to exclude a child from the lessons on this ground.' Reference is made to the subject in 'Class Singing'(18) by W.G. Whittaker, (1925). In the chapter on 'Ear Training', he summarises the musical deficiencies he has found in schools, in the following manner:

(1) Those who can sing with the class but who cannot sing alone.

(2) Those who can manage an upper part but not a lower.

(3) Those who can sing alone, but not with the rest of the class. He says that he has encountered this, but cannot explain it.

(4) Those whose ears are fairly correct but who cannot sing well.

(5) Those who cannot imitate at all.

He gave ear tests to groups of children and assessed their ability partly on the results. He maintains that singing is learnt primarily from the mother, and that more faulty singers are found in the ranks of those who have been looked

after by a paid nurse (who is less likely to sing to the child in her care than is the mother), than amongst those who have had maternal affection. The examination of 'hundreds of cases' of faulty musical ability, probably by means of the ear tests, has convinced him that in the vast majority of cases, the trouble is due to environment; and he goes on to criticise, in this connection, schools where there is little or no singing, as well as parents and teachers who do not allow children to sing because they cannot keep in tune. The residue are probably unable to sing because of lack of connection between brain and muscle. He says that children of this type cannot as a rule sing above E^1 at first, but that after they have been given many exercises, they quite suddenly manage to sing in the 'lower thin' register up to about B^1, and later still they go yet higher in the 'upper thin' register. He stresses the need for encouragement, and says that it is 'sheer wickedness' to send a child out of a singing class.

Clara Novello Davies in a book(3) entitled 'You Can Sing', (1928), uses these words:

'Never say you have "no ear" for music as I have yet to find anyone whose sense of pitch cannot be cultivated'.

In 'The Voice. Its Production and Reproduction',(16) by Stanley and Maxfield, (1934), there are two references to tone deafness, on pages 47 and 166:

'If the pupil is tone deaf he cannot be made to sing.'

' . . . the speaking voice cannot be trained when the subject is really tone deaf, since, under the circumstances, there is no medium of contact between the teacher and the pupil.'

The 'Handbook of Suggestions for Teachers' published in 1937 and reprinted in 1944 and 1945 (7) refers briefly to the subject, in a section on 'Ear Training and Sight Reading', page 188, as follows:

"Experience shows that if it is methodically taught from the early school stages upwards, children can be trained to read simple music at an early age and that only about one per cent turn out to be tone deaf."

C. E. Seashore in his 'Psychology of Music' published 1938 (13) refers to the subject in these words:

'Some people who pass as having normal hearing may not be able to hear a half tone, or even one whole tone difference. In extreme cases we may have pitch-deafness.'

No evidence is adduced, and the matter is left there.

In 'Psychology' by Norman L. Munn, (10) published in 1946, there is a chapter on the subject of 'Aptitudes' under the section headed, 'Aptitudes, Inborn Capacities, and Present Abilities,' on page 442, come these words:

"Some have claimed that ability to profit from musical training - that is to say aptitude for music, is limited by

the sort of ear, and perhaps brain structure, with which the individual has been born. Suppose, for example, that your basilar membrane or its neural connections with the brain were so constituted that you were unable to discriminate fairly small differences in pitch and intensity. No amount of musical training would make a good musician of you.

'Long before the days of aptitude tests in music, the writer was given a piccolo and an opportunity to join the school band. Although he practised assiduously, the bandmaster was always accusing him of making the sour notes which disturbed the symphonic effect. He was soon asked to leave the band, and even his parents finally persuaded him that the production of pleasing music was not in his line. More than twenty years later he took the Seashore Test of Musical Talent and found himself in the lowest percentile in pitch discrimination. In other words almost anybody has better pitch discrimination than he. If the test had been given before the piccolo was bought and the training begun, he could have avoided much discomfiture to others and much disappointment to himself.'

Evidence of a change in attitude is noticeable in two recent educational publications. Charles Hooper on pages 94, 95, and 96 of 'Teaching Music to Classes', (8) which was published in 1946, makes the point that, as we find most of the "growlers" in the Infant stage, and as they gradually improve

until at the top end of educational ladder they are very few indeed, it might be well to discover what the difficulties are and to try to help the child to overcome them quickly. He divides them into four categories:

(1) The medical cases suffering from deafness, adenoids, and physical defects of the vocal apparatus.

(2) The trouble of the individual who has not found his singing voice. The cause is environment, and the cure is often through contact with and imitation of normal voices. A case is quoted of a child who was considered unmusical because she could not sing. Later, it was found that she took obvious pleasure in listening to piano music. The trouble was that she had heard little singing in her own part of the vocal range; because, at the private school she attended there was little or no class singing; her father, a good amateur musician, was a bass, and her mother, also a musician, was a contralto.

(3) Those due to faulty listening because of lack of interest. This means, as a rule, that there is inability to recognise changes of pitch; and the remedy is to use visual and other impressions of height and depth to teach those differences in pitch.

(4) Those due to lack of control of the vocal muscles, a condition due to the inability of the ear to give critical correction.

He concludes by remarking on the deleterious effect that a

critical class can have on such persons; by stressing the fundamental need of creating in them a desire to do better; and by urging the development of self criticism in vocal matters. No mention is made of tone deafness.

In 'A Musical Guide for Schools',[12] by Priestley and Grayson, published in 1947, two paragraphs about non singers appear on pages 26 and 27 under the heading 'Ghosts':

'No problem causes more difficulty and annoyance to the infant class teacher than the presence and proclivities of the unfortunate "ghosts", "growlers", or "grunters". It ought to be clearly understood at the outset that not one child in a hundred is tone-deaf. Some have a slow ear, others a weak memory for musical sounds, but most frequently the outward and audible symptoms are the result of delayed development of the nervous mechanism controlling the muscles of the vocal organs. That such development is merely delayed is proved by the fact that by the time the post primary stage is reached, nearly all the "grunters" have ceased to "grunt".'

In the next paragraph they discuss remedies. The number of grunters, say the authors, is in direct ratio to the volume of singing (they are thinking of the infant stage), and restrained singing at this grade would circumvent the major part of the problem. Those remaining should be placed beside musical children, and should be instructed to sing quietly, and listen carefully to their neighbours. If the trouble

still persisted each child should be taken to the piano, a note of medium pitch should be played which he would be requested to sing to 'loo', and if he failed, the actual note he produced should be taken as a starting point. It should be played and repeated several times until the connection between voice and ear was established and from this point progress would be possible. Absolute privacy is essential. In contrast with these views was that expressed by a well known B. B. C. conductor who, early in 1949, was introducing a broadcast of an orchestral programme designed for children. In the course of some general remarks he mentioned the subject of tone-deafness and informed his listeners that some people were tone-deaf, because they could not sing tunes as other people could. This belief is still held by many people. In the issues of 'The Musical Times' (15) for November 1927, and for February and March 1928, appeared a letter, which was followed by articles on a subject which seemed to be related to that under discussion. The letter was from a seventy-four-year-old man who complained that he heard at a different pitch with each ear. A reply in the form of two articles on the subject followed. Edwin Smith, M.D., then coroner for N. E. London, who was the writer, said that he had had the same experience following a severe cold which had rendered one of his ears temporarily deaf. The difference of pitch had been a semitone in the middle of the keyboard,

almost a tone near the top, and rather less at the bottom; and it had been accompanied by a faulty location of the spot from which the sounds came. The trouble had lasted about a month; but had cleared up at the end of that time. He had found only one book in which this peculiarity had been mentioned and the authors had said it was due to a condition of the auditory nerve or nerve endings, though slight faults might be due to 'altered tension of the sound conduction apparatus (i.e. the drum and adjacent small bones of the middle ear).' Though in twenty-five years medical experience the writer had come across no parallel case, yet tests among some of his friends at this point had revealed discrepancies between ears.

Though these articles did not deal with so-called tone deafness, that is, inability to differentiate between tones, the subject of faulty hearing of tones seemed at first to be connected with the other, though there was, of course no suggestion of inability to differentiate at any time. It appeared to me possible that a discordant jangle might prevent a child from learning to sing; and the subject was dealt with by means of a test.

It will be realized that the subject has very little history attached to it as not a great deal of attention seems to have been given to it. It will be the object of this thesis to describe an attempt to investigate the subject in a scientific manner and to draw conclusions from the evidence given.

Before commencing a research which seeks to find out the causes of any defect it is necessary to be equipped with information about the organs in which the fault seems likely to be. In the present instance it may be due to a variety of causes. It may be because of some trouble in the outer, inner, or middle ear or else in its neural connections with the thalamus or the cortex. It may be due, on the other hand to a muscular or nervous affection, or possibly to some organic complaint, serious or trivial, of the vocal organs. Many people have the impression that it is caused by an aural defect which has a parallel in colour blindness.

It was not thought desirable to include a full description of the organs in the body of the thesis; but a description of the structure and working of the ear, the throat, and the eye, together with illustrative diagrams, will be found at the end in Appendix 1. All parts which are referred to in the course of the work will be found to be illustrated there. The description of the ear is taken from 'Hearing' by Stevens and Davis (17) and from 'Psychology' by Munn (10); that of the vocal organs mainly from 'The Mechanics of Singing' by Evetts and Worthington; that of the eye from 'Psychology' by Munn, (10). The diagram of the whole ear is copied from a drawing by Max Brödel, one of three hitherto unpublished drawings which were issued in book form in 1946 (1).

Chapter 2

TESTS AND METHODS OF INSTRUCTION

When doubt is thrown on a person's ability to sing, several questions arise, all of them relative to his vocal prowess. Has he any voice at all ? How far does his range, if any, extend ? What is the quality of his voice ? Can he hear normally ? Can he hear differences between notes or is he unable to discriminate ? Do both ears synchronise ? Does he play an instrument ? Does he listen with pleasure to vocal and instrumental music ? Are his home surroundings musical ?

In order to provide answers to these questions a number of tests and a number of questionnaires were used. The tests were applied to discover Vocal Ability, Range of Voice in semitones, Auditory Differentiation, Musical Intelligence, and differences in the pitch perception of both ears. The questionnaires were devised to find out the existence of interest in matters musical and of musical activity at home both by the boy or girl concerned and by the other members of the family, and also the possible causes of the disability. The non-singers were grouped into a single Experimental Group; and various bodies of normal singers were used for purposes of comparison and formed Control Groups.

After some consideration it was decided not to use any of the various so-called 'Helmholtz' notations, but to use a simpler

nomenclature. The C's of the normal pianoforte of $7\frac{1}{4}$ octaves were lettered as follows:

C_2, C_1, C, C^1 (middle C), C^2, C^3, C^4, C^5,

and these numbers were applied to all the notes in the octave above. The octave beginning with middle C was written: C^1, C^1 sharp, D^1, D^1 sharp, E^1, F^1, etcetera, or alternatively C^1, D^1, flat etcetera.

The tests of Vocal Ability and of Range were performed as follows. The boy or girl was asked to sing an ascending scale beginning with, as a rule, middle C (256 cycles). With a normal person this would be performed satisfactorily, and would be followed by similar scales at higher levels until A^2 sharp or B^2 was reached. Then came an 'all-out' effort to sing as high as possible; and on this the record of upper range was based. Finally, descending scales from middle C gave the downward range of notes. At first, and for a considerable time after the commencement of the research, the lowest extremity of the range was not tested for; and this had to be done later for the sake of the records. The lowest useful note in a treble voice is A (below middle C), and this was for long made the arbitrary lowest note of the range. Later it seemed that one possible explanation of the condition of singing disability might be that the voice was considerably lower than normal; and all those who had been, or were at the time under treatment, and all members of control groups,

were tested for the lowest notes in their register, and the respective ranges altered accordingly. The records relating to old boys were carefully revised and thought over; and new ranges for them, too, were thus established, based on the mean lowest note for the re-tested groups. The amended ranges agreed with my own recollections.

If a child failed to locate middle C and to sing up the scale, or if he sang a few notes, and then, lacking top notes, proceeded to drone, he was not given the same tests as the other people, but was encouraged to try to locate some central note like middle C, and then, step by step, to go up the scale. If he could in addition sing, within the limits of his voice, a few notes of a simple tune, he was encouraged to do so.

Vocal Ability

Voices were graded A, B, C, D and E, as follows:

Grade A. Voices of exceptional quality and power.

Grade B. Good voices without quite the strength and quality of the above.

Grade C. (The largest group). All average singing voices.

Grade D. Defective voices extending from those of children with fair range and quality who were unable to locate, to those who lacked notes but were able to make an attempt at singing within the limits of their range.

Grade E. Very bad voices; those who had little or no range and who either could not locate notes, or did so only with great difficulty.

Range

In only a few cases was it found that there was no apparent

range at all; and in every instance, there was so marked an improvement by the end of the second lesson, that it seemed reasonable to suppose that, normally, a small range of notes was, in fact, available. Accordingly an allowance of six semitones was made for such people; and no one appears in the records as having fewer than this. This was useful, too, in arriving at the initial range of certain old boys, who had simply been classified as having no range; for later experience convinced me that it would have been possible to get all of them to sing a few notes.

Auditory Acuity

An audiometer which gave group tests and which gave a reasonably good estimate of the hearing ability of each ear, was purchased by the Middlesbrough Education Authority, and came into use in February 1950. By the time I was able to use it, some of the Experimental Group had left school or removed to other districts; but a considerable portion of the group was able to be tested for auditory acuity. Each child was provided with an earphone and a headpiece, the earphone being attached to a record-playing apparatus. The 'phone was applied to each ear separately, and a number of tests were dictated from a record which was played over. Numbers were to be put in prescribed spaces on a prepared sheet. As the test progressed, the voice became less and less powerful; and a final calculation of the hearing loss in decibels for each ear was made from the number of omissions due to inability to

hear what was dictated. A normal ear should hear all or virtually all the numbers. This test was able to be given to thirty-two children of the Experimental Group.
This test was little more than an indication that loss of hearing existed, for it covered merely a limited part of the speech frequencies. Those whom the test indicated as having a hearing loss were later tested on a pure-tone audiometer, made available to me by a Middlesbrough specialist in diseases of the ear, throat, and nose, Mr R. M. Marshall, F.R.C.S.
To test Auditory Differentiation, an audiometer was obtained from King's College, Newcastle-upon-Tyne. This apparatus, which was an oscillator, gave out a pure tone which could be varied from 0 cycles to 16,000 cycles. There were two tone controls, one graduated in units of 50 cycles, the other in units of 10 cycles, and, by subtracting its readings from those on the other scale, it was possible to estimate differences of 10 cycles. Although the scale was not linear, it was also possible to guess with fair accuracy, amounts of 1 to 2 cycles. Power was controlled by two switches neither of them giving a reading in decibels. All tests were given at a uniform setting of the controls. A small room was available for the tests; but it was not possible to free it from echo and resonance. No earphones were provided, only a loud speaker; and this was placed so that the child could not see the controls. He sat facing it, about two feet away, and directly

in front of it.

Two levels of pitch, 250 cycles and 2000 cycles, were decided upon for the purpose of the tests. The one was chosen because of its central position in the musical scheme of things, and the other because it seemed desirable to test at the higher levels of the pianoforte.

If a child could discriminate satisfactorily at the two levels, it did not seem likely that he would have any difficulty at any other point in the pianoforte range, which, for practical purposes is all that matters. The tones at both ends of the range of the audiometer were sounded, and in no case did any child fail to hear in the regions of 20 cycles or of 11,000 cycles. Considerations of time also made it impossible to test at more than two levels; for, when parties of small children came from other schools to be tested, they had to be entertained and kept absolutely quiet in the room in which the audiometer was placed. Only occasionally was it possible to get help.

There was no instrument available in the district for measuring the stimulus in decibels at the time the tests of Differential Sensitivity were made. Readings were, however, taken on a sound-level meter at King's College after the audiometer had been returned. The conditions were not dissimilar from those at the school, and the instrument was placed in the same position relative to the speaker as the children had occupied in the tests. The readings were 68 decibels at

250 cycles, and 70 decibels at 2000 cycles.

The tests themselves were given in the following manner. The child seated himself in front of the loud speaker and was given several demonstrations of sinusoidal rise and fall in pitch at both levels. When it seemed that he understood this, he was given a few tests of the type to be applied, but of which no records were kept. It would have been easy to ask him to signal as soon as he heard a difference in pitch; but it became evident that this was not desirable in some cases, as imagination seemed to play a definite part in producing replies. Accordingly, it was decided that as soon as he heard any difference, he should be asked to state whether the pitch was rising or falling. This created a difficulty, for a few children had trouble in deciding whether a tone which they recognised as altering, was ascending or descending; but in cases like this, if, after a few tests at the same level of differentiation, it seemed evident that the child was actually hearing a difference, whether or not he was sure of its direction, I had to be satisfied with this. The preliminary tests gave a good idea of the amount the child could discriminate. He was told when the tests proper were to begin. At least ten tests at each level were given; sometimes the note moved upward, sometimes downward, and sometimes it was stationary. Each child was told to listen carefully; and as soon as he heard a difference, he was

instructed to say 'up' or 'down' as the case might be. If the tone was stationary, he either remarked on the fact or said nothing. If the alteration was obviously too small or too large I made the necessary adjustments. The difference in cycles between the two tones was recorded each time, and as soon as eight or ten consecutive correct results had been obtained, an average was made. The absolute minimum differential sensitivity was not aimed at, but rather, the smallest difference at which the child was able to decide the direction of the tone's movement.

Musical Intelligence (19)

The tests of Musical Intelligence were able to be given to groups of pupils. Gramophone records of a set of tests drawn up by Dr Wing, then Principal of Burderop Park Training College, were given to groups of pupils at each of the three schools concerned in the experiment. They are designed to test for the presence of seven of the fundamentals of a musical equipment.

Test 1. Chord Analysis (To detect the number of notes played in a single chord).

Twenty chords of from 1 to 5 notes are played and the examinee has to write down the number of notes in each chord.

Test 2. Pitch Change. (To detect a change of a single note in a repeated chord).

This test contains 30 questions; and in each, two chords are played. Sometimes one note is changed in the second chord, and the person being tested has to indicate by

means of the letters U, D and S, whether the altered note goes up or down, or whether the chord is the same as the first.

Test 3. Memory. (To detect a change of note in a short melody, 30 questions.)

A tune is played twice. On the second playing one note, not more, may be changed. The number of any such note is to be recorded by the pupil. Tunes are of three, four, five, six, seven, eight, nine, and ten notes; and to facilitate counting, a suitable number of dots are placed at each space in the answer paper. A line through the dot indicating the note changed, is required. Again, if the two tunes are the same, S, must be placed in the space provided.

Test 4. Rhythmic Accent (Choosing the better rhythmic accent in two performances of the same piece of music. 20 questions.)

The same tune is played twice in each question. Sometimes the accentuated notes are in a different place in the second time. The pupils are asked to indicate by the letter A or B which of the two playings better fits the tune. Again, if the tunes sound alike, S, must be used.

Test 5. Harmony (Judging the more appropriate of two harmonisations, using the same melody. 20 questions.)

The same tune is played twice. Sometimes the second playing has different harmonisations. The examinee must indicate by A, B, and S, which playing is most suitable or which tunes are unaltered.

Test 6. Intensity. (Judging the more appropriate mode of varying loudness, crescendo, decrescendo etc. in two performances of the same melody. 20 questions.)

The melody is played twice with different modes of varying the intensity. Again the candidate chooses the style of playing which better fits the tune, or writes S if the tunes appear to him the same.

Test 7. Phrasing. (Judging the more appropriate phrasing i.e. grouping of notes, by pauses, legato or staccato playing etc., in two performances of the same piece. 20 questions.)

In the two playings of the same tune, different phrasing is used, and the pupil again indicates the appropriate rendering or states if the two are alike.

In all the above tests the number of the question is called out in each case, and a suitable interval left between the questions. The candidate is directed to guess if in doubt as to the answer, and an allowance is made for this in the mark.

When the tests were applied to my groups, both Experimental and Control, all children over eleven years of age were given the whole test. Those under eleven were given the first three tests complete, and the first ten questions of each of the last four, a guessing total of 13 being given to this group. This ensured that some idea was gained of the abilities of the younger children in the subjects of Rhythm, Harmony, Intensity and Phrasing. The results gave me interesting information about individuals which otherwise I should not have had.

The scores for all tests were added up, the total possible being 160 marks. They were then converted into a Musical Age by the formula $\frac{\text{Mark} - 23}{3.1}$ from which a Musical Quotient was obtained. The children were also placed, according to score and age, into five grades, A, B, C, D, and E.

There are two questionnaires in the Wing tests:

(1) The first of these asks the children to place a tick opposite the word which most nearly describes their general attitude to music. These words are A. Very interested. B. Interested. C. Indifferent. D. Dislike.

(2) In this section the children are asked the following questions and space is provided for answers:- Does anyone at home play an instrument ? If so state who they are - what they play and roughly how much. Do you play yourself ? If so, how much ? If so, what instrument ? Have you had lessons ? If so state roughly for how many years. Do you play for your own pleasure ?

These questionnaires completed the Wing tests, and from then gradings for Interest, for Instrumental Music at home, and for the Musical Activity of the examinee were obtained. In all the cases treated since January 1948, assessments for Interest were also obtained at the beginning of the course of lessons, and were compared with those from the Wing questionnaire, which came much later.

The test for synchronisation of the ears was carried out on children of the Experimental Group. The children were asked

to stand with the left ear towards the piano, the right ear being covered. C was firmly struck and held for a few seconds so that the impression of the tone could be retained. Then the children were asked to turn round so that the right ear was towards the piano and the left ear covered. Again the same note was struck and the children were asked if the note sounded the same in both ears, or if it sounded higher or lower. This test was repeated at the pitch levels, C^1, C^2, C^3 and the results were recorded.

In an attempt to find information which would help to discover the causes of inability to sing, a questionnaire was framed. The older children wrote the answers down on paper, the younger ones were not required to do this; they were written down by me as the children answered them. The questions were explained where necessary. They were as follows:-

(1) Did you ever at any time feel that you would never be able to sing ? Yes or No.

(2) Might the trouble have come about because of comments on your voice ? Yes, No, or Partly.

(3) Might it have been because there was little singing at home, and, therefore, little for you to imitate when you were small ? Yes, No, or Partly.

(4) Was it due to lack of interest in singing ? Yes, No, or Partly.

(5) Was it caused by deafness, or by some ear, throat, or nose trouble ? Yes, No, or Partly.

(6) Have you ever been told not to sing at school ? Yes or No.

(7) If "Yes", was it by one or more persons ?

(8) Can you tell me anything else about the possible causes ?

METHODS OF INSTRUCTION

These varied, of course, with the individuals concerned, but, broadly speaking, the aims were:

1. To establish confidence.
2. To increase the vocal range.
3. To improve flexibility, and the ability to locate notes.
4. To establish the power of tone production.
5. To increase the interest in music.

If a boy droned through lack of high notes, these were developed by a course of ascending scales, the starting note being steadily raised. If he could not get beyond a certain point he was encouraged to do so. The vowel sounds 'loo' and 'lah' were most useful, particularly the former,for reasons which will be dealt with later.

Many children could not, at first, locate with the voice a note of medium pitch played on the piano, and such a person would be asked to sing any note he could, this would be played, and the connection established in this way. It was later found that, with a note like middle C, those who could not locate it with ease, could do so if they were strongly and persistently

urged to try; and if a visual impression of height and depth was indicated by the voice and the free hand: 'UP ! UP ! UP !' 'A little further!' and so on, the note being repeatedly played all the time. The same procedure was effective when, in the singing of tunes, notes were missed or incorrectly sung. A firm insistence on the performance of high notes occurring in a tune and of which a poor singer may be afraid, is essential.

For a considerable time, the early lessons were devoted largely to ascending and descending scales, with a view to increasing the range and developing the voice, tunes being introduced later; but experience showed that the sooner the children started to sing tunes, the sooner did they gain confidence in their ability to do so, and the more speedy was the cure. Accordingly it became the practice, even in the first lessons, to let them attempt to sing tunes, or parts of tunes, usually to 'loo' or 'lah', but sometimes, also, to the words. Thus the problem of note location was tackled from the first.

The vowel sound 'lah' was used for exercises at first; but following the extraordinary success of the use of 'loo', this was adopted in its place as the syllable to which they were sung. The reason is that, when this sound is used, the voice is, as it were, produced at the front of the mouth, the muscles and vocal organs being in an easy and comfortable position., the resonators functioning correctly, and the thin mechanism, natural in children, being employed. It is this method of

voice production which is responsible for what is known as the 'head' voice in boys; and the adoption of this vowel sound guarantees that, from the start, no distortion is possible. This is a very important matter.

The choice of suitable tunes, or rather, the finding of any tune known to the boy or girl, presented a difficulty. It was soon realized that these people could recognise tunes with which they were familiar; but it often happened that they were familiar with only one or two.

Then, too, the tune had to be simple, without too many leaps and with plenty of stepwise movement. 'Good King Wenceslas' proved to be the ideal tune for the purpose. No child was found who did not know the first four lines; and a few were found who seemed to know little else. Where exclusion from the singing class had not been the practice, and the boys and girls had had the opportunity of hearing and trying to sing well-known tunes, there was a much better foundation on which to build. When three or four easy songs had been thoroughly learnt, the main obstacles had as a rule been overcome; and complete cure was usually speedy. Songs found to be suitable were:

'Good King Wenceslas'
'This Old Man'
'Polly Wolly Doodle'
'Camptown Races'
'While Shepherds Watched'
'Ould John Braddlum'
'John Peel'
'John Brown's Body'
'The Poacher'.

Almost all these are to be found in 'The New Fellowship Song Book'.(3) If limited range was the trouble, the tune was transposed down so that it was within the bounds of the child's range. It was found that a strong playing of the tune on the pianoforte, usually without harmonies, helped the singer very much, but singing by the instructor was not, in general, so helpful: occasionally it was; usually it was not.

The establishment of confidence was of great importance; and was accomplished by a free, even lavish, use of praise, almost none of criticism, and by the exercise of much patience. Whether or not improvement occurred, the child was always told, at the end of the lesson, that it had done so. Suggestion was freely used, and an attitude of self-confidence established. As far as possible nothing was allowed to interfere with this; and the co-operation of the respective head teachers was enlisted in this matter and was willingly given.

These, in brief, were the methods used to correct the defect. Fundamental to all treatment was the cultivation of a friendly and happy relationship between pupil and instructor. This all-important factor was achieved in every case; otherwise little progress would have been possible.

Chapter 3

DESCRIPTION OF RESULTS

Eighty-one persons were given lessons designed to correct vocal defects. This includes fourteen whose lessons still continue, though nine of them are now (January 1950) very nearly cured. In the early stages no tests of Musical Ability of the Wing type were used or were, indeed, available; and no audiometer was able to be obtained in the district. Furthermore, although records were kept of the progress of all who received lessons, details of range, interest, music at home etc., were not always taken down. When intensive research began in 1948, many of these boys were no longer at school; and whilst it was possible to get much relevant information about them, it was not possible to give them the Wing tests, or to measure their minimum differential sensitivity by means of the audiometer which had been procured.

The Experimental Group for the full range of tests and questionnaires was made up of fifty children, drawn from three Middlesbrough schools. Ten were from a Preparatory School, fifteen from a Primary School, and twenty-five from Acklam Hall Grammar School, all three schools being situated in residential areas of the town. This was approximately equal to 12% of those who attended the Preparatory School, 4% of those at the Primary School, and 6% of those at Acklam Hall,

the percentage for the combined schools being 6%. Intelligence quotients were at first obtainable for only the Acklam portion of the group though it was later possible to get I.Q.'s for a few children who were tested for entrance to the local Grammar Schools. The range for the combined groups was from 85 to 140. The other children concerned were given intelligence gradings by the heads of their respective schools; and in the absence of I.Q.'s, the equating of Experimental and Control Groups was done on this basis. Only rarely does the Experimental Group appear with this number. A few children moved to other areas; there were the occasional absences at the times when the tests were being given; and past members of the group, about whom the necessary information was available, were also, where possible, included.

There were several Control Groups. Those for Vocal Quality and Range were drawn up from the entrants to Acklam Hall for 1948, and included all but a few who were absent at the time the tests were given. Those for Differential Sensitivity, Home Music, and Instrumentalists, consisted of children of the same age and grade as the corresponding members of the Experimental Group, and that for Musical Intelligence was made up of pupils from the same schools as those of the Experimental Group, with whom they were equated in age and intelligence. The Interest Group was of first-year Acklam boys. This varied composition of the groups was partly a

matter of convenience, and partly because it was thought desirable to have children of various types in them. One disadvantage became apparent later: it was impossible to work out 'r' for the Control, and for the combined Experimental and Control Groups between the two variables, Range and Differential Sensitivity, because the Control Group for the Range tests was entirely of Acklam boys, whereas that for the tests of Differential Sensitivity was a mixed group which included only a few of those who took the Range tests. As, however, there was a highly significant relationship between Vocal Quality and Range (χ^2 = 37.375 for 16 cells and 9 degrees of freedom), and as there was no significant relationship between Vocal Quality and Differential Sensitivity, nothing seemed to be lost by these omissions.

Tests of Vocal Quality (Grades: A, B, C, D, E)

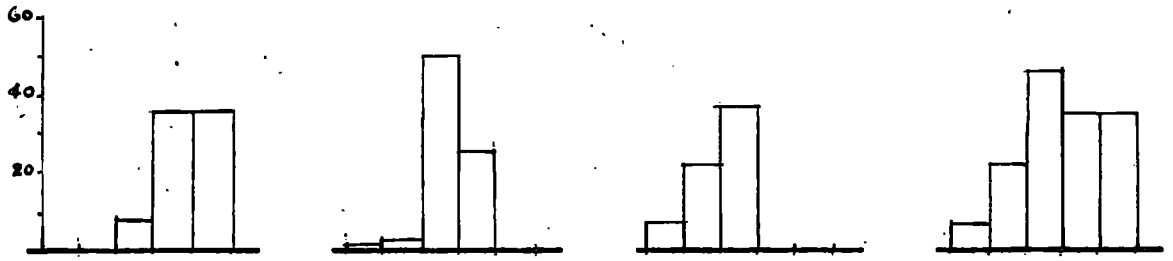
Experimental Group (N = 78)

Grading on entry		Grading at end of treatment, or, in some cases, after several months, the course being incomplete	
A	0	A	2
B	0	B	3
C	8 (all 'minus')	C	49
D	35	D	24
E	35	E	0
Mean, between D and E		Mean, slightly below C.	

Control Group (N = 66)

Grading on entry	
A	7
B	22
C	37
D	0
E	0
Mean, between B and C	

Distribution Curves



Expl. Gp. before treatment

Expl. Gp. after treatment

Control Gp.

Combined Gps at beginning.

The treatment of non-singers was followed by very gratifying results. The curve for this group before they received any lessons, is negatively skewed; it could hardly be otherwise. The curve for the same group after treatment still has a slightly negative skew, but is much nearer to normal, and this in spite of the fact that treatment in a number of cases was incomplete when the final tests were taken. The curve for the Control Group is, of course, positively skewed. That for the Combined Groups has a negative skew, as is to be expected in a group with a highly disproportionate number of non-singers. It is probable that the curve for an ordinary class would almost always have a positive trend, as non-singers form a very small part of it, at any rate at Grammar School level.

Tests of Vocal Range in Semitones (Grades: A, more than 27;
B, 20 to 26;
C, 13 to 19;
D, 6 to 12.)

Experimental Group (N = 64)

On entry		After treatment	
A	0	A	12
B	16	B	44
C	33	C	8
D	15	D	0
Mean	15.23	Mean	24.22
σ	6.48	σ	3.74

Control Group (N = 67)

On entry	
A	54
B	12
C	1
D	0
Mean	29.45
σ	3.48

Comparison of means of Expl. Gp. after treatment, and Control Gp.

$\frac{\text{Diff}}{\text{S.e. diff.}} = 7.597$ Significant

A group of first-year normals had, on entry,

N = 51, Mean = 26.39, σ = 3.47

Means of Lowest Notes

Experimental Group

Between G sharp and A

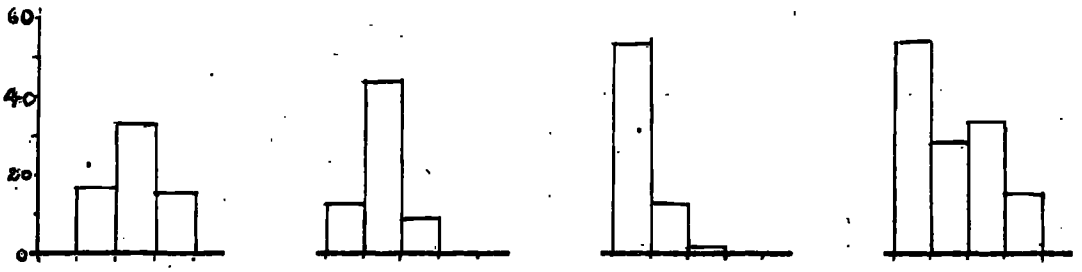
Control Group

Between F sharp and G

Another Group (29 first-year normals)

F sharp

Distribution Curves



Expl. Gp. before treatment | Expl. Gp. after treatment | Control Gp. | Combined Gps at beginning

Great increases in vocal span, due to the lessons given, are shown by the curves for the Experimental Group. The negative skew of the first curve becomes positive in the second, though not so positive as that of the Control Group. The ranges after treatment, of those who formed the Experimental Group were not in general quite as large as the ranges of the members of the Control Group; and the means of the two groups differed significantly, though not of course nearly as much as did the mean first range of the Experimental Group differ from that of the Control. Not all defective voices had had the full course of treatment when the final tests were taken; but, even so, a remarkable improvement is indicated.

The tests for the lowest note in the register indicated that, far from having a tendency to be at a lower level than ordinary voices, the defective voices could not as a rule sing as

deeply as could the normal. The mean of the lowest attainable notes of the Experimental Group of sixty-four was between G sharp and A. That of the corresponding Control Group of sixty-seven, which comprised almost the whole of the 1948 entrants to Acklam Hall, was between G and F sharp, a tone lower. This group had been at the school for a year when they were tested. Twenty-nine of the 1949 entrants were similarly tested shortly after their arrival at the school and the mean of their lowest notes was exactly F sharp. The note C_1 was the lowest reached by any treble voice. Only two members of the Experimental Group achieved it. One of these was able after two lessons to reach B^2, and had a normal span; the other was a boy who had persistently misused his voice by much shouting at football matches etc. Just before he came to the school he had had a severe bronchial cold which continued to affect him for quite a time and accentuated the defect. After several lessons he managed to reach G^2 sharp, and sang satisfactorily within his limits. With care and effort he ought to have developed a normal voice of class 'C'; but persistent misuse and a lack of interest prevented this. On the other hand 11 voices of really good quality in the Control Group also got down to D, E or F. They had almost always very high upper ranges, extending in eight instances to C^3 or higher. In a normal voice, great depth almost invariably accompanied great height, but below A the notes were always thin and of little

practical use. The range of the abnormal voice was almost always shorter at both ends.

Tests of Minimum Differential Sensitivity

at 250 cycles and 2000 cycles

Grades:	250 cycles	2000 cycles
A	1 to 3 "	2 to 8 "
B	4 to 6 "	9 to 15 "
C	7 to 9 "	16 to 22 "
D	10 to 12 "	23+ "

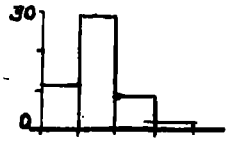
Experimental Group (N = 51)

	At 250 Cycles	At 2000 Cycles
A	12	4
B	29	17
C	8	19
D	2	11
	Mean 5.00	Mean 16.82
	σ 6.12	σ 6.12

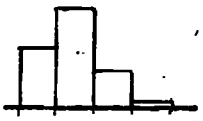
Control Group (N = 51)

	At 250 Cycles	At 2000 Cycles
A	15	12
B	25	15
C	9	20
D	2	4
	Mean 4.71	Mean 15.32
	σ 2.32	σ 7.15
	$\frac{\text{Diff}}{\text{S.e.diff}}$ = 0.7	$\frac{\text{Diff}}{\text{S.e.diff}}$ = 1.15
	Not significant	Not significant

Distribution Curves



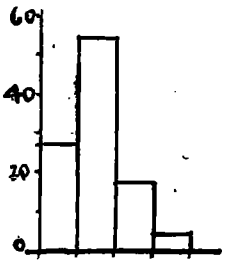
Expl. Gp at 250c



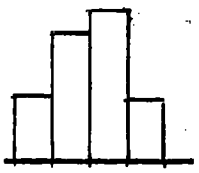
Control Gp. at 250c

Expl. Gp. at 2000c

Control Gp. at 2000c.



Combined Gps. at 250c



Combined Gps. at 2000c.

The results of these tests were very interesting indeed. At the 250 cycle level a semitone represents a difference of about 150 cycles, and of approximately 118 cycles at the 2000 cycle level. For the Experimental Group the Mean Minimum Differential Sensitivity at 250 cycles was 5.00 cycles, and for the Control Group, 4.71; at 2000 cycles the means were 16.82 and 15.32 respectively. At neither level was there a significant difference between the means of the two groups. The poorest results were, of 11 cycles at 250, and of 30 at

2000. Both were normal singers ! One of the best results, 2 cycles at both levels of pitch (probably not more than 1 cycle in actual fact) came from a boy who had been in class E for Vocal Quality, but was at the time of the test in class C, having been cured of his voice defect. A curious point was that for the Acklam sections of the groups in each of which there were twenty-seven boys, the means for the Experimental part were 5.1 at 250, and 17.59 at 2000 cycles; whereas for the Control part they were 3.30 and 10.30 cycles respectively, a significant difference at both levels, though really very small, all things considered.

The average $\Delta f/f$ for all cases tested was 0.0200 at 250 cycles and 68 decibels; that at 2000 cycles and 70 decibels was 0.0024. In an experiment by E. G. Shower and R. Biddulph (13) described in the 'Journal of the Acoustical Society of America' III, 1931, pages 275 to 287, the average $\Delta f/f$ for five persons was 0.0100 at 250 cycles and 70 decibels, and 0.0017 at 2000 cycles and 70 decibels. It will be seen that the minimums achieved by Shower and Biddulph were less than those in the present experiment. They, however, set out with the object of ascertaining the smallest difference which the average human ear could detect, and the subjects were men between the ages of 20 and 30 years. The conditions in my experiment were very different. In the first place, the main desire was to find out whether any of those concerned were unable to differentiate

between the notes as far apart as the semitones on the pianoforte. In the second, they were not able to press a button when they heard a difference; they had, instead, to say 'up' or 'down' according to the way in which the note moved. This meant that they had to decide whether it was actually moving; then the direction of that movement; and finally, they had to enunciate a word, during all of which time the rotary condenser was in motion. In the third place, some of the younger members of the group had difficulty in understanding what a rise or fall in tone meant. There was, also, a general tendency to wait until they were sure before they spoke. In these circumstances, therefore, the differences between the means for two sets of readings are not of any great importance; and it was demonstrated that all of these children could in fact differentiate at levels of considerably less than one semitone.

Tests of Musical Intelligence (Gradings of Wing's Tests A, B, C, D, E)

Experimental Groups

Acklam Hall (N= 25)		Combined (Acklam, Preparatory, Primary) (N = 45)	
A	0	A	0
B	2	B	5
C	13	C	26
D	8	D	12
E	2	E	2
Mean	94.6	Mean	98.02
σ	20.88	σ	21.60

Control Groups

Acklam Hall (N = 25)

A	7
B	11
C	7
D	0
E	0

Mean 146.8
σ 15.46

t = 6.839
Significant above 0.01

Combined (as above. N = 45)

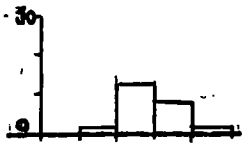
A	11
B	16
C	17
D	1
E	0

Mean 124.84
σ 49.37

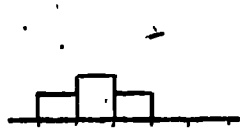
$\frac{\text{Diff}}{\text{S.E.diff}}$ = 2.5

Significant.

Distribution Curves

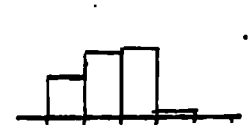


Expl. Gp. Acklam

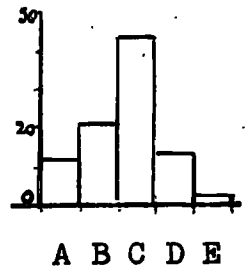


Contl. Gp. Acklam

Expl. Combined Gps.



Contl. Combined Gps.



Combd. Expl. + Contl.

The gradings given above are, as stated, those supplied with the tests; but, in addition to the grading of those tested, musical ages and musical quotients were worked out. The mean of the M. Q.'s for the Experimental Group of 45 was 98.02; for the Control Group it was 124.84, a significant difference. The disparity was even more marked for the Acklam Hall Group, the respective means being 94.6 and 146.8. The highest musical quotient was 209, that of a boy at the Primary School and in the Control Group, who was given an Intelligence grading of A by his headmaster; the lowest was 53, that of an Acklam boy with an I.Q. of 134. The histograms show a fairly normal curve for the full Experimental Group and a curve with a distinctly positive skew for the corresponding Control Group. For the combined groups the skew is also positive. A definite relationship between musical intelligence and singing ability is indicated.

Interest (Grades: A, B, C, D)

Experimental Group (N = 52)

Before Treatment		After or During Treatment	
A	3	A	5
B	16	B	26
C	27	C	18
D	6	D	3
Mean between B and C (nearer C)		Mean, between B and C (nearer B)	

Control Group (N = 60. At time of 1st reading in Expl. Gp)

A	12
B	22
C	21
D	5

Mean between B and C (Nearer B)

Distribution Curves

January 1949

Expl. Gp.

June 1949

Expl. Gp.

Control Gp.

Interest was greater in the Control Group, though the second readings for the Experimental Group indicated that it had improved in this respect until it was not very far behind. This was most pleasing. The mean of the first gradings for the Experimental Group was nearer to C than to B, that is to say there was a considerable measure of indifference, whereas the mean of the second readings for this group showed a definite increase in interest, and was nearer to B. The mean of the Control Group was nearer still to B. Three members of the Experimental Group were in class A before their treatment commenced; after treatment this number increased to five, whereas that for the same grade in the Control Group was twelve. The numbers for the B and C classes in the

Experimental Group, after treatment, and in the Control Group were very similar. Interest at a high level was more obvious in the Control Group, though the Experimental Group was not by any means devoid of it.

Home Music (Grades: A- much, B- some, C- none)

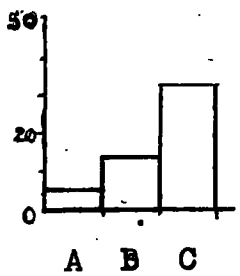
Experimental Group (N = 49)		Control Group (N = 49)	
A	4	A	14
B	13	B	18
C	32	C	17
Mean, nearer C than B		Mean, B.	

Numbers of Instrumentalists and of Non-Players

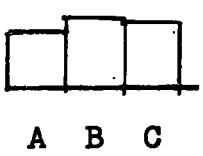
	Experimental Group (N = 49)	Control Group (N = 49)
Players	10	29
Non-players	39	20

Distribution Curves

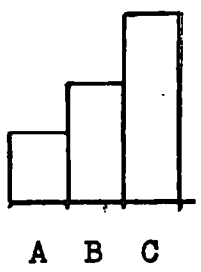
Home Music



Expl. Gp.

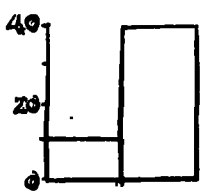


Contl. Gp.

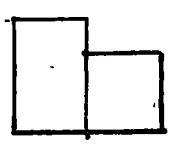


Combined Gps.

Instrumentalists



Expl. Gp.



Contl. Gp.

The questionnaire on Home Music showed that in the Experimental Group almost two-thirds of the number were without any, but that in the Control Group the figures were fairly evenly divided, with rather more in the B and C classes than in the A. The difference was very marked. Equally noticeable was the difference in the numbers of instrumentalists: more than half the Control Group were players, as compared with only one-fifth of the Experimental Group.

The test to discover whether or not the two ears were synchronised for pitch was given to thirty-six members of the Experimental Group, all who could be contacted at the time. Without exception they heard the same note in each ear at the four levels at which the test was given. The number includes the four boys who suffered from a hearing defect due to damage or infection. It seems reasonable to suppose that a similar result would have been obtained in the other cases had tests been possible. The results appear to rule out any likelihood that the defect was due in the first place to inability to hear at the same pitch in both ears, a defect which would have made it extremely difficult to locate notes accurately.

The questionnaire designed to discover from the children information which might suggest the causes of the trouble, was given to thirty-five children of the Experimental Group. Eleven said that they had at one time thought that they would never be able to sing. Sixteen considered that the trouble was due

wholly or in part to criticism of their vocal efforts. Ten thought that little or no singing at home had been a major or a contributory cause. Seventeen said that it was due in a greater or lesser degree to lack of interest. Four thought that defective hearing was the main cause; and two, that ear or nose affections might have been partly to blame. Twenty-six had been prevented from singing at one time or another. Question 8, which asked for any further information, provided but little.

Correlation of Groups (N. in brackets)

Experimental Group.

	M.Q.	I.Q.	Range	Diff. S.
M.Q.		0.349 (32)	0.208 (45)	-0.027 (45)
I.Q.			-0.133 (36)	0.202 (35)
Range				0.039 (49)

None of the coefficients was significant.

Control Group

	M.Q.	I.Q.	Range	Diff. S.
M.Q.		0.08 (25)	0.538 (25)	0.131 (36)
I.Q.			0.448 (49)	-0.289 (25)

The coefficients between M.Q. and Range, and between I.Q. and Range, were significant.

Combined Experimental and Control Groups

	M.Q.	I.Q.	Range	Diff. S.
M.Q.		0.187 (57)	0.47 (70)	0.12 (81)
I.Q.			0.119 (85)	

The coefficient between M.Q. and Range was significant.

Voice Quality and other Variables: Experimental Group

With M.Q. χ^2 = 6.510 16 cells, D.F.=9, Not significant at 5% level.
" I.Q. " = 9.159 " " " " " " " " " "
" Diff.S. " = 6.218 " " " " " " " " " "
"Interest " = 6.510 " " " " " " " " " "
" Range " =37.357 " " " " Significant at <1%

Correlation coefficients were worked out by the Product-moment method between the four variables, M.Q., I.Q., Range, and Differential Sensitivity, for the Experimental Group. Similar coefficients were obtained for the Control Group and for the Combined Groups. There was not a large enough Control Group to enable a coefficient to be calculated between Range and Differential Sensitivity either for this group or for the Combined Groups. The reasons for this are set out in paragraph 3 of this chapter. The value of 'r' between I.Q. and Differential Sensitivity for the Combined Groups was not worked out as it did not seem to have any bearing on the subject under discussion. Differential Sensitivity was included at only the 2000 cycle level; for a correlation coefficient of +0.7 was found to exist between the results at the two levels,

and the curves for 2000 cycles seemed rather more normal than those for 250 cycles.

Not one of the coefficients for the Experimental Group was significant. There were, however, two in the Control Group, those for M.Q. and Range, and for I.Q. and Range; and there was one for the combined groups, that for M.Q. and Range. Only one of the values of χ^2 was significant, that for the relationship between Range and Voice Quality. It was highly so, and indicated that the two gradings were extremely accurate.

The significant correlation between M.Q. and Range for both Control and Combined Groups indicates a definite relationship between musical intelligence and singing ability. The correlation between I.Q. and Range for the Control Group, even though nothing comparable occurs in the Experimental Group seems to point to a slight connection between the two variables, and tends to confirm Wing's conclusion that 'The capacity to deal with music is somewhat aided by general intelligence'. ('Tests of Musical Ability and Appreciation' (17)). There is no connection indicated between Range and Differential Sensitivity, nor between M.Q. and Differential Sensitivity, nor yet again between Voice and Differential Sensitivity. This negative evidence is very interesting, and points to the conclusion that non-singers can differentiate between tones in a normal manner, and that the causes of singing disability must be sought elsewhere.

Taken as a whole, the tests provided much interesting and useful information. The condition was shown to be in most instances capable of cure, and in all cases, of improvement. There was no sign of inability to distinguish notes from one another, the two groups differing little in this respect. Vocal range was shown to be capable not merely of improvement but of very great increase indeed. In general, the disability was accompanied by lower musical intelligence, by less interest, by a much smaller degree of musical environment, and by a less active participation in musical activity. On the other hand, though none of the non-singers was in the highest grade for Musical Intelligence, quite a number were in the second. Three of the children were in the highest Interest group and sixteen in the second, before they were taught to sing. A few came from musical homes, and a small number of them were studying musical instruments. There were some extremes: a boy with a very poor voice who had been unable to sing at all, became a worthy member of vocal class A; and a member of vocal class E, who differentiated between tones separated by only two cycles at both levels, has already been mentioned. The results gave food for much thought.

Chapter 4

CASE STUDIES

Several aspects of vocal ability were tested. The results were compared with those from control groups made up of children from the same schools, and some definite conclusions emerge. Case histories were kept of all persons treated; and the progress of these persons, in general, confirmed the findings of the tests. Mostly, improvement followed certain defined paths; but there were, in addition, some out-of-the-ordinary examples of progress. It was the exception rather than the rule to find that there was only one factor which led to the trouble, though often a certain cause was followed by certain results which in themselves were the cause of fixing the complaint, and making it more difficult to dislodge. The trouble might have been due to some slight defect, either hereditary or acquired, in the vocal apparatus; but in some instances it was mainly due to lack of musical surroundings, and to lack of opportunity to imitate others or of incentive to sing at all. Often it was aggravated by unfortunate remarks on the part of adults, and by a general feeling of inability to do what others did in vocal matters.

One class of defect was that in which the trouble was primarily due to lack of upper notes. The first person of this type to be discovered in 1940 in the school was a brilliant Jewish boy of eleven years, who had a harsh, strident voice, and who

could not sing because he could only reach B^1 and was so much in the habit of droning the higher notes that he sometimes droned the notes which he, normally, could use correctly. He was given a course of scale singing to the vowels 'loo' and 'lah', and at first could reach only to the note named. He was started on a higher note and urged to sing the full scale of C^1. This he soon succeeded in doing, and another step was taken, followed by yet another. The new notes were not very pleasant to listen to at first; but practice improved them; and, indeed, it was found that the general quality of his voice was improving steadily, thanks to the exercises in production. In a reasonable time (approximately two months) he was able to sing to F^2; but beyond this he never was able to go. Song practice was very early introduced into his lessons and soon he was able to sing the songs which his friends were doing, though his location of high notes was sometimes bad at first. His voice became serviceable and quite powerful, though never as sweet as could have been wished. The fact that he could reach to F^2 brought within his compass most of the songs which the average person sings; and, by avoiding the rare notes above this, he enjoyed his music lessons and became an enthusiast. He continued to sing after his voice had changed, and as soon as he was able to do so, joined the School Mixed-Voice Choir, of Treble, Alto, Tenor and Bass voices, and also the Male-Voice Choir of Tenor and

Bass, as a tenor, and remained a tenor in quality and range until he went to a university. In addition he was a leader in the part singing and unison singing of the sixth form when he was a member of it. Like many of his race he was highly interested in cultural activities of all kinds, and this provided him with another outlet, from which he manifestly gained great pleasure and profit. I was of the opinion, at the time, that there was some slight defect in the construction of the vocal apparatus, or else that some malformation had occurred through misuse, which caused the faulty sound-production. His speaking voice was harsh and strident and had a rather unpleasant nasal quality which lent colour to this theory. It was not the normal boy's voice. At one time, following some observation of the vocal quality of the average Jewish voice, I wondered whether there might be some racial peculiarity which made for the curious phonation. The importance of this case to me was that the virtue of urging a boy to try to sing notes seemingly far out of his range, was discovered.

With the next boy of this type, who came to the school in 1942 as did also the three following, there was not really a great deal wrong. He could get up to E^2 with difficulty and could sing in a feeble way within his limits. He was given a course of ascending scales, and, like the last boy, quickly added several notes to his range, and managed to sing to the region of A^2. The cause was 'lack of use' probably due to

unmusical surroundings which provided little stimulus for him. A further case was very similar to the first except that the boy was not a Jew. His initial range was the same and his treatment followed a similar pattern, his final range being to F^2. He had to be taught to sing,and at first he was only at home with simple songs, having evidently sung very little; but he quickly improved and within the limits of his voice sang quite normally. He, too, enjoyed singing,and obviously benefited from his lessons.

Two more boys with voices of similar type were given lessons. Each had the same range, to C^2; each was trained in much the same way, that is by means of ascending scales sung to vowel sounds, and both had normal singing voices within four or five weeks, being able to sing easily up to G^2. Another, whose treatment was started at the same time, progressed much more slowly, however. His instruction followed a similar course; but his was a most unmelodious voice; he belonged to an unmusical home; and he was of a rough and rather crude disposition, without innate or acquired culture of any kind, as far as I could judge. It took the better part of two terms to train his voice to sing anything like reasonably; but patience was rewarded, and he could ultimately do so. The shape of the lower jaw and mouth were not conducive to good articulation, as the former protruded and the latter was unnatural in consequence. He was given no further training apart from the others; but joined with his class in singing

voice exercises, hymns and songs; and, in the following year, was good enough to take part in a large public recital of music, given by the school in one of the churches in the town, at which the boys of his year formed one of the singing groups. He gained in interest and keenness, and was able to sing, if not beautifully, at least well enough to join happily in every musical activity in which his form took part.

Four pupils with this type of disability, who came to the school in 1944, and three others who came the following year, were almost identical in initial range, treatment, and in time needed for cure of the defect. They could, with difficulty, sing up to C^2 or D^2, and were made to sing ascending scales to 'lah'. Following a few weeks of this, they improved their respective ranges to G^2 or A^2 and could sing tunes perfectly. All had normal, pleasing voices; and all appreciated their newly-acquired skills. I did not consider that these boys had any particular vocal defect to account for their lack of top notes at first. It might have been that they had learned to sing more slowly than others had done, and had lost confidence because they had compared themselves unfavourably with those who were ahead. Two of them had never been allowed to sing at school.

Two boys who had limited ranges, and who were in the same form, gave some trouble. One had a harsh and rough voice, lacking high notes, and the other seemed never to have developed his to any degree. They both had a very poor cultural background,

and seemed to have little use for music or indeed culture of any kind. They were given scales and exercises, and both acquired several extra notes, the first reaching G^2, and the second reaching F^2. The voice of the latter was thin and poor. The first boy reached the period of voice change before I was really satisfied with him; but the other, although he was now able to sing, was so manifestly neither interested, nor desirous of doing so, that lessons were discontinued and his vocal quality was not, therefore, much improved. They were good examples of one of the causes of the complaint,—lack of interest due to home surroundings, poor in one instance in all ways, and in the other, weak in cultural activity. They were unfortunate in that, as well as having no enthusiasm for artistic things themselves, they were members of a form which was dull and lifeless. A class in which there were a sufficient number of enthusiasts for singing might have provided the necessary spur to them. As it was, they had no chance of being carried along on any tide of culture; for the form, on the whole, lacked it.

In 1948 a little girl aged nine at the Preparatory School sang up to D^2 in her first test, after a little persuasion. She was soon able to sing songs within her range; and she quickly developed her tone production until her voice was sweet and pleasant. For a long while, however, she could not get beyond E^2; and the top notes lacked flexibility; she could not move

about easily amongst them. She was singing so pleasantly otherwise that it was decided to discontinue lessons, and to see if normal class-singing would improve matters. Up to this point she had had ten voice lessons. After four months her voice was again tested and it was found that a certain amount of regression had occurred; for she was less sure of her top notes, and her flexibility was certainly no better than before. She was given a course of ascending scales to 'loo', with songs as well. Progress was slow, but sure, and she gradually acquired more notes, and her flexibility increased. After a further sixteen lessons she was able to sing $\dot{B}^2$, and her ability to move quickly amongst the upper notes was improved beyond recognition. Her singing voice was good. She was given no further lessons; but, when tested a few months later, she was singing quite normally, and had been completely cured of any defect.

A remarkable feature in this case was the amount of exhortation which was necessary to help her to achieve an extra note in her range. She was most enthusiastic,and co-operated well; but her progress was slow. As the upper part of the scale was reached, at any rate during the training period, when she was attempting to reach a higher note than she had ever done before, her movement was retarded, and she would then have to go from note to note, taking a fresh breath after each one. When the desired new note was achieved, she was encouraged to retain and develop it, the note being repeatedly and loudly

played on the piano. Each step forward was made the object of praise, and she was never criticised for failure. Her twenty-six lessons were spread over a year. She had a very good home, which, though not actively musical, encouraged her in her efforts. She was very fond of dancing, and indeed danced very well. The results of her lessons were most satisfactory. Her voice was not low at all, her deepest note being B below middle C; but she had not previously been allowed to sing at school, because she droned if the song was at all high. The lesson learnt by me from her treatment was of the value of strong and persistent encouragement to sing higher notes. At one point it had seemed that she would never extend her register upward; but the desired result was achieved, not only without damage to her voice, but with very considerable improvement to it. The best aspect of the treatment was its effect upon her psychological make-up. She was a happy little girl, very enthusiastic and very confident except for one thing: in musical matters she had no confidence and little pleasure, her music report from school always being a bitter disappointment to her. As a result of her lessons she became as happy about this as about other subjects; and this, more than anything else, made one feel that the work had been worth while.

Two boys, entrants in 1948 to Acklam Hall School, could sing within limits, but had harsh voices, one in particular being

very raucous, partly because of much shouting at football matches, and partly because of the after effects of laryngitis. They sang scales to 'loo', and the first quickly added three semitones to his range, and improved the quality of his voice. He was not, in fact, unable to sing. The other could only sing to D^2 at first, and that with difficulty. At the end of his first term he had reached G^2 sharp, and sang correctly if not beautifully. He did not maintain his newly-found ability because of his persistent shouting; and, as he seemed to have little interest, lessons were discontinued. It was found later that he had lost nearly all the ground gained; but it was not considered worth while to restart training. The lessons had, however, borne some fruit; for it was discovered that, though he had now given up any attempt to sing at the treble level, he did enjoy singing, having a few favourite songs for which he made constant requests. Both these boys did in fact show a marked increase of interest in music. Five other boys whose treatment is just about to begin, and who are all able to sing a little, but who lack normal top notes, complete this group. They are only slightly defective, and not comparable with those already described.

Chapter 5

CASE STUDIES (Continued)

The ability to sing within a limited range was by no means usual. By far the greater part of those who received lessons were at first unable to locate notes at all, still less to sing tunes. The first boy to be trained successfully was a case in point, and actually 72% of the children concerned were in this category. They, too, lacked range almost always; but the complete lack of control over the utterance of notes in songs was the most marked feature.

Some reacted quickly and soon became normal; whereas some took a longer time, but made steady progress. There was, however, a hard core of really difficult cases, people who had almost no range and no ability to locate atall, and with whom almost always progress was very, very slow. It is with this group that this chapter will be concerned. Success with them was general though not universal, particularly at first. Improvement was, however, always obtained.

The first boy of this type was a 1940 entrant and he was the first also to be given private lessons, it being obvious that the opening minutes of a singing period and the publicity of the music room during lesson time could not possibly provide the best conditions for his efforts. He was a very strong willed (or maybe obstinate) youth, who, it seemed could

never be prevailed upon to take singing seriously. He had psychological troubles, in particular, a dread of feathers. This fixation added to his boastful and forward attitude led to much torment from the more cruel of his fellow-pupils. I formed the opinion that his inability to sing was also largely psychological, for he had not a pleasant voice, and this had almost certainly been the subject of comment. Much time and effort was spent upon him, without a completely satisfactory result. He was considered at the time to have virtually no range, and no power of location at first; but, after some lessons, was able to sing scales to 'lah' fairly well. At the location of single notes he was very slow; and he had very often to be encouraged again and again, and helped in direction; but definite progress resulted, and a start was made with the singing of simple folk-songs to 'lah'. He was ultimately able to sing a few with fair accuracy; but at this stage, his voice began to change and lessons were discontinued. I had not at this time learnt the value of persistence over a long period; and later experience has convinced me that if he had been kept to his lessons he would ultimately have been cured. He was evidently convinced that he would never be able to sing; and the efforts to persuade him to do so were exhausting.

Another boy, who came to the school in the following year, 1941,

with whom full success was not attained, did,however, like the last mentioned, improve considerably. He seemed to have a range of only a few notes; and he was given location exercises, which were followed by scales, and then by simple folk songs. Up to a point he improved steadily, if slowly, and was able to sing a known song without too many mistakes. Those which did occur were due to inability to leap with precision from one note to another if the interval was too large: if the leap was upward, he often fell short; if downward, he tended to overrun it. He was not troubled by any feeling of inferiority; in fact,I came to the conclusion that lack of self-criticism was part of his trouble. I wondered, too, whether he had a less sensitive ear than others, but had at that time no means of testing this. He could hear differences between pianoforte notes quite well; and, in the course of eighteen months, had made considerable progress. At this point he was absent from school because of an operation on his throat, the object of which was not, unfortunately, recorded in my notes,but was probably for the removal of the tonsils. On his return it was most difficult to get him to attend for his private lessons. He usually had some specious excuse, and after a while I ceased to give him extra tuition. His attitude in this respect was in keeping with his general conduct; and I felt that any further expenditure of time on him was not

justified. He came from a home which was very good in the material sense, but which was not given to cultural activities; and this probably accounted to a certain extent for his defect. I blame the break in the continuity of the lessons for his loss of interest.

In the Autumn of 1941 an even worse instance of singing disability was discovered in the first-form entrants. The boy was rather sensitive, and was at first very nervous about attempting to sing; and his father expressed, in his presence, the opinion that he would never succeed in doing so. He had almost no range and no control over his voice when he made his first efforts. Progress was extremely slow, and it took him quite a while to learn to locate notes. He finally learned to do this reasonably accurately and was given the usual ascending and descending scales; but his early attempts were very poor indeed and his disbelief in the possibility of success was very evident. Patience, however, was rewarded; and after a long period of trial and error he could sing first of all ascending, and later, descending scales. His first attempts at songs were very, very, poor; and for a time he made but slow progress, and had little ability to follow the line of the melody. He worked very hard, and gradually learned to sing folk-songs to vowel sounds, and later, to words. Progress was now rather quicker than it had been; and in an attempt to hasten matters, he was given a lesson on several consecutive

days. Progress was quickened a little, but the weekly lesson seemed to be more fruitful in his case. He was now making really good attempts at quite difficult classical songs, and was in process of mastering 'My Heart Ever Faithful' by Bach, when his voice began rapidly to change, and lessons were discontinued. At the end of his fifth and last year at the school he was again tested and it was found that whilst he was not quite perfect there seemed to have been no loss of ground. It appears, therefore, that the two music periods per week which I took with his form had enabled him to maintain the ability which he had gained. His earlier extra voice lessons had lasted for a quarter of an hour or longer. He had had at least one every week, excluding holidays, for nearly two years. I found them very tiring.

At the same time another very difficult case was under treatment. He, too, had a very small range indeed, and no vocal ability. He could not attempt a song. His timidity in voice lessons was extreme; and at the slightest noise he started, evidently afraid of being overheard when he was trying to sing. This was in complete contrast with his demeanour in other circumstances; for he became a good rugby player and cricketer, an excellent actor, who first rose to prominence in this department by taking, at three days' notice, the principal male part in 'She Stoops to Conquer', and he achieved a major scholarship

at the end of his school career. He showed no sign of nervousness elsewhere; but if anyone entered the room during his voice lesson, or even rattled the door handle, the effect was fatal. Location exercises were followed by the singing of ascending and descending scales, and later, songs were attempted to 'lah'; but little progress was made and lessons were discontinued. Seven years later, when he was in his final year, treatment was recommenced. His voice was, of course, deep. He began to sing scales, and progress was again slow. He was then asked to sing 'Good King Wenceslas', and 'God Save the King', to lah, and did them much better than the scales. He said that he was surprised at his own confidence; and it was noticeable that high notes which had been difficult of attainment in a scale, were sung easily when they occurred in songs. He was immediately trained with much harder songs, and progress was very rapid indeed. He became very interested, and at Christmas time he went out singing carols with a church carol party which performed most pleasantly. It was not possible to do much more for him as he was at the end of his school course; and I had doubts about his ability to maintain the ground gained, for any thoughtless criticism might lead to regression. He was, however, virtually cured, though his case had at one time seemed hopeless.

No very bad cases of singing disability appeared in 1942 and 1943, though several boys in whom the defect was not quite

so marked were treated. They will be dealt with in Chapter 6. In 1944, however, four voices of the type dealt with in the present chapter were discovered. The first had a range of about five notes and his voice had little quality; he was, moreover, shy, and had no cultural background. Little progress was made, and after a while his lessons were discontinued, as it was felt that little could be done with him. In the light of later experience I began to think that I had possibly been mistaken. Lessons were restarted in his fifth year. He was a small boy and had not developed very quickly; and at fifteen years of age, his voice, such as it was, seemed to be little different from what it had been at first, though almost all the other boys in the class had had the normal change. In view of the need for haste he was taken for a daily lesson, as far as this was possible; and the period of tuition lasted from the November to the February of his last school year. By means of the vowel 'loo' he was again exercised with ascending scales and the easy carol 'Good King Wenceslas', at a low pitch. In the first two lessons his range was A to A^1, but in the third he reached D^2. At this time he had a severe cold, and this had a deleterious effect on his tone-production. Easy songs were introduced and the scale practice was continued. At the fifth lesson he again reached D^2, at the seventh F^2, and F^2 sharp at the eighth. His catarrhal cold became still worse, and in the next lesson he could reach

only E^2. He had by this time demonstrated his ability to sing, within the limits of his range, such songs as 'The Trout', 'Rose Among the Heather', and 'Nymphs and Shepherds', in which he had, however, to avoid the occasional note which was beyond him. Several further attempts to achieve more notes at the top of his register failed, and I came to the conclusion that to persist would be dangerous, because of the possibility that the change in his voice had begun; so, as it seemed to be in as satisfactory a condition as was possible in the circumstances, no further voice tuition was given. He did, of course, continue to sing in his class. His disability was due to an indifferent voice, lack of musical surroundings, and lack of confidence.

The second boy of this group was an intelligent boy, but he had no cultural background and no interest whatever in music. He had, like the others, a poor voice, having a very small range of chesty notes. Lessons were soon discontinued because of lack of success in increasing his range. It was noticeably difficult to ensure regular attendance, and he tried hard to avoid voice lessons. In view of the success which had attended a resumption of training with others, a fresh start was made with him in his fifth year at school, and rapid success was achieved. He sang scales to 'loo', and his range quickly extended so that he could sing from G_1 to D^1. He could, in addition, sing very easy tunes to 'loo'. In spite of the

fact that he was not interested and did not come if he could avoid it, in the course of several lessons, he learnt to sing some of the songs from 'The Scottish Students Song Book', which his class sometimes sang in their singing periods. He had to be urged to attempt high notes. Lack of interest on his part persisted, and I discontinued the lessons after eleven months, in the course of which I had managed to have only twelve lessons with him. That was not the end of the matter, however. As recently as January of this year, 1950, whilst I was checking statistics relative to certain cases of which he was one, he expressed the desire to recommence his singing lessons, and this was, of course, arranged. This new accession of interest is most pleasing and makes one feel that the work has been worth while. I am confident that any remaining defect will be quickly rectified.

The third boy was very intelligent and was not without cultural interests, though music was not one of them. He was the son of a colleague. He had a very small range of about six or seven semitones, and could neither locate notes nor sing tunes. Lessons at first followed a normal course; he was given exercises in location, and later in scales; and when he could do this with fair accuracy, he was allowed to try to sing simple tunes to 'lah'. He developed a normal voice of fair quality, rather thin, but quite powerful. He made considerable progress during his first year, though not as much

as was hoped; he did not help himself very much, as he tended to dream during the class singing lessons, in which he ought to have been exercising his voice as much as possible. In the second year his attitude became very disappointing. He failed repeatedly to turn up for his period of voice training, and it became necessary to tell him specifically to come, on each occasion. At one time I despaired of him; but after I had talked to him several times on the subject, his attendance improved, and progress was immediate. His range, at the end of the second year, was that of a normal treble voice, and he could sing as well as the majority of his fellows. He was good enough to take part in the items sung by his year in the School Concert, among which was 'The Erl King' by Schubert. When tested in his third year he was completely cured of the defect, and was not only able to sing any known song but was also able to sight-read accurately. I cannot say that his interest was very much increased, because of his success, at this stage. The lesson learnt from this boy's treatment was the value of persistence over an indefinite period, if necessary. He was, I realized, in the nature of a 'test case', in the eyes of my colleagues, and I was quite determined, if need be, to compel him to sing. This was in fact what did happen. He was given lessons weekly. When it was realized that he was cured, the voice lessons ceased. Three years later, when tested, he tended to avoid the top notes of a song. However,

lessons were not restarted; but it was interesting to hear that he had joined a chapel choir in their carol-singing expeditions at Christmas 1949. I myself heard this choir and found little to criticise. Evidently the enthusiasm of friends had infected my pupil and he had now the ability and the desire to take part. My time had not been wasted.

The fourth of this group presented still further problems. He had, as usual, little range and no ability to locate notes. He was a 'C' form boy, but he was highly imaginative and with a natural aptitude for writing, his style being very promising. He was in many respects careless and without forethought; but he could be extremely enthusiastic about things he liked to do. His treatment was at first normal, and he progressed well until the end of his first term. After Christmas, however, he had a period of absence; and when he returned, it was extremely difficult to persuade him to come for any lessons. He was full of plausible excuses. In consequence he did not improve but, instead, lost ground. His final argument was that he was sure he would never be able to sing, and thought he was wasting his time. He was, however, compelled to attend as before. Progress was steady; he improved his tone production, learnt a number of songs, and, by the beginning of his third year, was completely cured of the defect, in that he had a normal range, a very pleasant voice, and ability to sing, accurately, known songs and sight-reading exercises. He

seemed to enjoy his singing now that he could do it without effort.

As a number of less difficult cases had been successfully taught to sing during the same period, considerable optimism was felt about the methods employed. Much practical knowledge and experience had been accumulated, and the time needed for the rectification of the defect in ordinary instances had been lessened.

In the following year, 1945, there were three difficult cases. One was a most brilliant boy with an I.Q. of 140 and a many-sided cultural interest, which included music. He was not, however, able to sing at all; he was, indeed, a very bad case of singing disability. His singing range was almost non-existent. Location of notes, scales both ascending and descending, and simple songs and carols formed the basis of his training. As soon as he realized he had a voice, he became very enthusiastic indeed, and it was not long before it became evident that his voice was developing very well. Within a term he was greatly improved, location became steadily better, and by the end of the second term he was able to sing 'The Trout'. He sang with his form in the School Concert in May of that year, and by Midsummer was the possessor of a voice which was not merely normal, but strong and pleasing in tone. He was in Grade B of the Wing Tests. He said that there was little singing at home, that he had heard adverse

comment on his voice in the Junior School, and that more than one teacher had prevented him from trying to sing. It seemed that the cause of the defect was that he had not learnt to sing as a young boy, and that the defect had been fixed by the comments and the lack of opportunity to try to sing.

The training of the other boy proved to be most interesting. He, too, was very intelligent. At his first test hewas able to sing with difficulty about ten semitones, and his vocal tone was gruff in the extreme. After a few lessons in which progress was negligible, he was asked to sing ascending scales to 'loo'; the syllable 'lah' having previously been the one employed in his and other cases at this stage. He did not indeed sing the scale, but, instead, went quite suddenly, and in an uncontrolled manner, to the highest notes in the normal treble register. The attempt was repeated several times and it became evident that he was singing for the first time in his life with the 'thin' mechanism of voice production. He was amazed and delighted when it was explained to him. For several lessons he concentrated on scales to 'loo', and it was clear that the quality of his voice was now quite different from what it had been, for it was sweet and pleasant. It was discovered at this point that he could no longer sing below F, where, previously, all his available notes had been. Gradually he learnt to sing the ascending scales correctly, without soaring in an uncontrolled way; next he sang

descending scales in addition to the others, and gradually recovered his lost lower notes, which he now produced in a new and sweeter manner. Finally he began to attempt songs to 'loo', and later, to words. He improved steadily, but the defect was not fully corrected when the Summer Holiday began. Lessons were resumed in the Autumn Term and it was at once clear that he was better than he had been before the holidays began. In a few weeks he was cured; but the lessons were continued for the purpose of developing his voice, which was showing promise of being really good. This confidence in his voice was justified; for in the following year he was admitted to a picked treble choir which was being formed, and he was a worthy member of it: The trouble had arisen, in his case,because he had heard no singing at home. It had later been aggravated by the criticism of his schoolmates, and by the fact that he had never been allowed to sing at school as a small boy. The results of his voice lessons were most pleasing.

The third boy of this year was of very poor physique. His range was up to C^2; but he could only sing two or three notes at a time, so poor was his breathing and so narrow his chest. He was given a number of breathing exercises before each period of tuition,and gradually improved in this respect though he was never able to sing a scale an octave in length without taking a breath. The preliminary stage was lengthy, and it

it was more than a year before his voice was taking shape at all. One of his troubles was that he had no self-confidence whatever, and an immense amount of suggestion was necessary. The next step was to try to develop his ability to sustain notes, and this was done by taking high notes one by one, and asking him to sing them to 'ah' for as long as possible. This proved to be most beneficial; and his power increased considerably. He was still lacking in resilience in his top notes, and to rectify this he was made to sing tunes of the folk-song type at a much higher pitch than normal. This forced him to work hard in the upper part of his register. The effects were sometimes curious; but his improvement was very marked, and at the end of his second year at school his voice was improved beyond recognition. His lack of confidence in himself was still a handicap, but he could sing quite well; and a very gratifying feature was that in the self-grading which enters into Wing's tests, he assessed himself as belonging to the A group for Interest.

The only real vocal defect during the next three years was one primarily requiring medical attention, and it is dealt with at the end of this chapter, where three others of this type are discussed. There were, in addition, a number of less difficult cases.

The next person with a severe disability was one of ten cases

from the pupils of Middlesbrough Preparatory School, who began their corrective lessons in May 1948. The boy in question was ten years old and was of average intelligence. His home conditions were quite good, except that his people were unmusical and not very interested in cultural activities. He himself did not care for music. His teacher said that, after much effort, she had got him to sing three notes. In his first lesson with me he began by not being able to sing at all; after some encouragement he was found to be able to locate middle C; and by the end of the lesson he had managed to progress up the scale to C^2 to the vowel 'loo'. His newly found notes seemed to be of average quality. In the second lesson he repeated his achievement of the first. In the third he was able to sing as high as C^2 sharp, his progress being leisurely, and with a breath for each note. In descending scales, which were taken more quickly, he tended to overrun the piano, a common fault at this stage. He managed, finally, to sing little groups of notes taken from ascending scales. In the fourth period he made his first attempt at the singing of songs, the difficulty being that he knew very few well enough for this. He had, however, found that tunes like 'Polly Wolly Doodle', 'This Old Man', and 'Ould John Braddlum', were attractive to him when sung in class; and, together with the ever-useful 'Good King Wenceslas', they formed the material of this lesson. His attempt was very creditable; and he was, as usual, given praise for his efforts.

The fifth period found him able to sing up to E^2 using not only the vowel 'loo', but also ~~to~~ 'lah', a change which may not seem worthy of comment, but which is also, in practice, a new difficulty to be overcome. The songs of the previous lesson were sung, and in addition 'Camptown Races' and 'God Save the King', to vowel sounds, of course. In the sixth, his progress was excellent. He sang up to A^2 in his scale practice, and made better attempts at the same songs. In the seventh lesson he sang with ease up to A^2, and practised the same songs. The following week, after scale practice, he was allowed to try to sing a new tune, 'The Orderlies' Song', which was not known to him, as well as those mentioned previously. Scale practice was now used to sweeten his tone. The ninth lesson saw improvement in that respect. In the tenth lesson he reached B^2 flat in his scale practice; a further improvement in quality was noted; and most important of all, a considerable increase in interest, due probably to the sense of achievement which he was feeling, and to the unfailing praise with which even his smallest successes were rewarded. The eleventh saw little advance as he had developed a cold, and his activities were limited to the singing of four of the songs he was familiar with; in the twelfth, however, it was obvious at once that he was progressing very rapidly towards a cure. Scales and songs were much better; his only difficulty was in making a skip of any size in the high notes.

'The Poacher' was the only new song attempted. The thirteenth found him almost cured; the carol 'Unto us a boy is born', was begun. The next saw further progress, and in the fifteenth he sang from A to A^2, a range of two octaves. He added a hymn, 'Fight the Good Fight', and a carol, 'The Holly and the Ivy', to his repertoire during this lesson; and, in addition, made creditable renderings of 'Who is Sylvia', 'Hark, Hark,the Lark', and 'Nymphs and Shepherds', all songs which he had heard and attempted in his class. The sixteenth found him with no trace of the defect. He had by this time been moved to a Secondary Modern School, where there was some singing; and when another test was taken three months later, his range had increased so much, that he was able to sing from G to C^3 and had in all respects a normal singing voice. Another trial several months later confirmed the complete success of the course of lessons, the first sixteen of which had covered from May to November of the year in which they took place. In the audiometer test he heard a difference of 1 to 2 cycles at 250 cycles and 2000 cycles, and he was in grade C of the Wing Tests, as were all the Preparatory children in the disability group. His was the most rapid progress of all referred to in this chapter and his increasing interest was evident all the time.

Unlike some of the others his progress was uninterrupted. He came without fail to the lessons and had no set backs in the shape of illnesses, which would have broken the habit of

attendance and might have led to regression. In addition, his interest was aroused by the fact that he could soon make attempts at songs, using the words. From this time onwards, songs were introduced as early as possible, frequently, even, in the first lesson; and it was found that even the worst cases could, as a general rule, attempt to sing 'Good King Wenceslas', this helping to establish immediately the idea that they could really sing, and that all that was required was practice.

One other pupil of the Preparatory School merits inclusion in the 'Difficult' group. He, like another boy whose treatment has been described in this chapter, is also the son of a colleague. He is an intelligent boy with a good home, in which the interests are strongly scientific and sporting, not musical. In the first lesson he had a very limited range and no power of location; but in the same lesson he managed to sing the major scale from C^1 to C^2, each note being taken separately, to 'loo'; and he managed half of 'Good King Wenceslas' to the same vowel sound. In the second he sang up to G^2, and located notes fairly well. Scales, songs, and location exercises were taken in each lesson, the songs being very largely those which the last-mentioned boy had sung, as these were found to be suitable for the purpose. In the fifth lesson I slowly played all the notes of the pianoforte from the lowest to the highest and asked if he heard them separately. He did so, but said that in his first lesson two notes 'near the middle of the keyboard' had sounded alike.

As far as I could make out, the notes were E^1 and F^1. He was definite about this, though he had, in fact, managed to differentiate them when he sang up the scale. It was probably due to lack of practice in listening to notes. Slow but definite progress was made until the Summer Vacation. After the holiday new songs of a simple kind were attempted. First he sang the tunes to 'loo', then he tried the first verses. In one or two cases he sang right through the songs. His voice developed and the tone became quite sweet; he found it difficult, however, to sing notes below F^1 at all, and he retained a tendency to soar when the notes moved upwards. Various exercises were tried, among them the singing of long sustained notes; the songs already sung formed, however, the basis of his work, as it was considered that if he could learn to sing a few songs perfectly, he would benefit. He was always able to tell when he sang out of tune, but he remained slow in rectifying the fault. By November he had the large range of from D^1 to B^2, though it cost him an effort to locate the notes below F^1. At this point he had a severe cold, and, because of absence, the routine of the lessons was broken, and his interest waned. This was an unfortunate setback, but in the New Year instruction continued on similar lines, and steady progress was made. Lessons continued until the summer, when his attendance at this school terminated; he continued to progress, though without attaining perfection in song rendering. He did not seem to be able easily to surmount what was evidently

the final obstacle. In the autumn he was transferred to Acklam Hall School, and, ironically enough, it was not found possible to give him more than a few lessons in his first term there. Lessons have been restarted in his second term and he has lost no ground. It is hoped that a regular course will quickly complete the cure. His defect was due to lack of home music and singing, and it was made worse by criticism in his first school.

None of the others in this Preparatory School group was sufficiently bad to be included amongst those discussed in this chapter. True, some took as long, or almost as long to master the disability; but their voices were not quite so bad at the beginning, and progress was actually more steady, and almost always quicker in the early stages.

Six of the seventeen children from the Primary School, which was the third school concerned, will be described in this chapter. Two of them, up to the present, have shown some improvement in ability to locate, and sing tunes, but very little in range. Their lessons began in January 1949.

The first of these was a boy of ten years, and of average intelligence, certainly not more, whose whole interest seemed to be centred on football. He had no cultural background whatever, but he was quite amiable, and willing to try to sing. In his first lesson he sang from Middle C to F^1. His voice was of poor quality, and was produced in a most curious way with the chin pushed forward, the 'thick' mechanism being the

only one he could use. It was not possible to correct this as it was his normal position for speech. In his second lesson he sang to D^2, after a struggle, and definite progress seemed to have been made. In the third lesson he managed to go only to G^1, and in those succeeding he rarely got beyond A^1. At the same time he learned to sing simple tunes which were within, or almost entirely within, the range of notes at his disposal. Allowing for gaps caused by holidays and the occasional absences from school, the lessons so far have covered the period of one year. In the last lesson of the year, after several attempts, and much exhortation, he suddenly went up to E^2 using both 'loo' and 'lah', the 'thin' register being used for the first time. New songs were tried in the keys which this improvement made possible, but he was only partially successful in achieving these notes in a song. This was the first sign of real improvement for many weeks. It may be possible to build on this foundation when lessons are re-commenced, but the lack of background and of real interest in music may prove a retarding influence. I have wondered whether the real underlying difficulty is the shape of the jaw. He speaks in a manner, not uncommon in some parts of the town, which results in an abnormal protrusion of the bottom jaw, a habit probably learnt from his associates, and which seems to result in distortion of the resonators and larynx. His voice, as a result, is gruff and unpleasing; and practice which lasts for a few minutes only every week, cannot possibly, in a short

time, counteract the ingrained habits of years. It may be, however, that persistence will have its effect. It is of interest that his ability to differentiate was shown in the audiometer tests to be very good indeed. He was in grade D of the Wing Tests.

(1D) The second of these boys was eight years of age and seemed to be of less than average intelligence, though he was very keen to try to sing. He, too, was lacking in cultural background, and was living in a children's home belonging to the Middlesbrough Corporation. In the first lesson he sang, with difficulty, from A to D^1 using the syllable 'loo', and attempted the first two lines of 'Good King Wenceslas'. In the next lesson he improved and sang up to G^1; in the following lesson he reached A^1. This marked his limit for several weeks. In his seventh lesson he sang up to C^2, but in the following weeks he developed a cold and got no higher than A^1, and this remained his top note for some time. At the present time he can only sing comfortably to B^1. He sings simple songs within these limits.

I noticed that he had a slightly protruding upper jaw, and, in addition, seemed to have a mode of utterance indicative of adenoids or of catarrh. He was examined by the school doctor, and no mention was made of catarrh or adenoids; but the muffled resonation seems to be abnormal and further investigation will have to be made.

Of the other four children, two are, at the time of writing,

almost cured, and two are making rapid progress. The first of this small group, a boy aged nine years, was able to locate and sing only middle C in the first voice lesson; but in the second he sang from C^1 to C^2; and in the third he went to D^2 and managed two lines of 'Good King Wenceslas'. He improved rapidly in the singing of songs, but not so rapidly in the acquisition of higher notes. For quite a time he could extend his range no further than E^2. His control of notes in songs continued, however, to improve; and at last he began to acquire some of the higher notes, and finally reached A^2 after lessons had been in progress for ten months. The position at the moment is that he is able to sing simple songs perfectly and is slowly gaining notes. Though he has reached the note A^2, it would not be correct to say that the notes from F^2 to A^2 are quite under his control. His lowest note is B. The quality of his voice is somewhat rough, but it ought to improve with training, though he will never have a good voice. He should, however, be able to enjoy his singing lessons. His home was not entirely without music. I formed the opinion that his rather poor voice had made it difficult for him to learn to sing when he was younger. He needed lessons; for he could not produce his voice at all for singing purposes. He had not been allowed to try to sing, and he was a sensitive boy who would feel this rather keenly; but whilst this would not help, it is doubtful whether in his case any amount of effort without guidance would have availed him anything. One

helpful feature in this boy's training has been his keenness throughout, which undoubtedly has made for a more rapid improvement.

The second of these four, a girl of the same age who came from a rather poor and unmusical home, sang from C^1 to F^1 in the first lesson. She managed also to sing, very haltingly, two lines of 'Wenceslas', the tune being played in the key of E flat. She was very shy and afraid of attempting high notes, though in her second lesson she sang, to 'loo', up to E^2 flat. She soon learnt to sing a number of songs, first of all to 'loo', and later to the words. She gradually increased her range to E^2, and later still to F^2. Her lowest note is middle C. She is very much improved, and should, if lessons are continued for a sufficient length of time, increase her range by several semitones. She was never prevented from singing, but I did not feel that she could have taught herself to sing. Possibly, however, if she had been surrounded by singing from babyhood, and had had encouragement, especially in her early attempts, the story would have been different.

The third case, a boy of nine and of less than average intelligence, and lacking any cultural background, sang, in the first voice test, from C^1 to A^1, and also attempted, not very successfully, the first two lines of 'Wenceslas'. His voice was very strange, having a thin quality in the low, and a very loud and hard quality in the upper notes. It had been the subject of comment, though he had never been prevented from

singing. In the course of the next two lessons he sang to C^2. His strenuous efforts to hit the high notes were amazing to watch; he was, however, praised for the earnestness of his attempts. The tone improved a little under the influence of the sound 'loo', and by the sixth lesson he was able to sing up to F^2. He has not, so far, got higher than F^2 sharp; but he has learned to sing a number of songs, mostly to 'loo', as his voice needs much exercise to sweeten it and his tone deteriorates when words are used. His lowest note is B. With musical surroundings and steady and frequent lessons in voice production, he ought to sing quite reasonably, as his voice has already improved beyond recognition.

The fourth of this particular group was ten years of age. His home was unmusical, and he himself was lacking in self-confidence. His first range was from C^1 to A^1 and he could not sing in tune. In his second lesson his location of notes improved, but his range remained the same. His fourth lesson found him able to reach C^2 and to sing the first two lines of 'Wenceslas'. Then came an attempt at 'Away in a Manger', to 'loo', with fair success. In his ninth lesson he reached D, in his thirteenth, E^2 flat, and E^2 in his fifteenth. He also managed to sing 'Polly Wolly Doodle' to 'loo'. An almost complete lack of acquaintance with songs of any type, was a hindrance to progress, and at first he did not seem to have a knowledge of any other than the first-named carol. The quality of his voice is still harsh; but scale exercises

to 'loo' have improved it, and will in time sweeten the tone. Progress has been slow, but definite and considerable; and, given time, he should acquire a reasonably useful singing voice.

It remains to deal with four cases in whom the defect was very severe and who had with it an organic condition of the throat or nose. With three of them, the trouble was a severe infection of the nose and sinus which led to middle-ear deafness. With the other, damage had been done to the throat by successive operations.

The first came to my notice when he entered Acklam Hall School in 1943. He could hit low notes quite accurately, but could not sing a tune. His range extended to B^1 flat. He was given exercises to extend his range, and after a few lessons he sang up to G^2; but said that to sing high notes was painful. He was questioned on the subject of his voice; and I elicited from him that, several years before, he had had an operation for the removal of tonsils, but that they had grown again from the roots after their removal, and a second operation had been found necessary. In time, one of them had grown yet again. A throat specialist, who confirmed that the tonsil was growing, said that the throat was 'puckered! I was satisfied that the muscles of his throat had been affected by the two cuttings and that this was the cause of the pain. He was not made to sing in the music lessons. He was of little more than average intelligence and had no particular interest

in music.

(2D) The second case was a boy who entered the school in 1946. He sang from C^1 to A^1 in his voice test, the quality being rough and toneless; and he had no ability to locate notes or sing tunes. He had a most severe catarrhal condition of the nasal passages. He had had three attacks of pneumonia, one just prior to his commencing at the school. He was hard of hearing, though he heard all the notes on the pianoforte when they were played to him. He told me that, in an illness two years previously, his doctor had said he had 'All the symptoms of meningitis, without the germ'. His mother confirmed these statements and added that he was 'nervous'. I began with ascending scales to 'loo' and continued with them for a month without any progress being evident. Then, quite suddenly, he sang a scale which continued up to D^2, which was several notes higher than before, the quality being new and sweeter. I suggested that he tried to attack the catarrh from which he was suffering, by gargling; and he did this for quite a while. In the next lesson the improvement was maintained, the same note being reached; and he was able to sing 'Wenceslas' and 'God Save the King' to 'loo'. He did not make any further progress in extending his range, but maintained what he had already achieved. He began the following term with an attack of tonsilitis. When he returned he sang to C^2 and I was pleased with this under the circumstances; but in the next lesson he was back to his

original range and tone, and no amount of work made the slightest impression. His catarrhal condition did not improve in any way and I realized that there was no possibility of improvement in vocal ability until it had subsided. I ceased to give him regular lessons, but occasionally tried out his voice. There was never any sign of improvement and the catarrh was invariably as bad as ever. In 1948, realizing that nothing was being done about this, I arranged with the School Medical Service to have him examined by a specialist. As a result of this he went into hospital, and a cleansing operation was performed in the following spring, which immediately removed the inflammation. It was impossible to take him for any voice lessons at the time, as I was busy with the audiometric and other tests described in Chapter 2, and I had no time to spare for any extra voice lessons; but he spoke in a clear voice, and was better in health than he had been for some time.

In October I was able to resume his lessons. He had, unfortunately, caught cold, though this was different from the catarrh of previous months. His voice was unbroken, and he was given a daily lesson for a fortnight. His progress was extraordinary. On the first day he sang from A to C^2; and on the second, from G to D^2, and later in the lesson, to B flat^2. In the third lesson he sang 'Riding Down from Bangor', 'A-Roving', and three hymns, 'Holy ! Holy ! Holy !', 'Let us

with a gladsome mind', and 'Immortal, Invisible'. His singing of the hymns and songs, which was to the words, was reasonably accurate and pleasing. Only occasionally had mistakes to be corrected; and the tone, in spite of the cold, was much better than in the early days. More songs were sung as the days went on, and at the end of the fortnight I considered it safe to leave him. He would, without any doubt, have been classed as tone-deaf at one time.

When I discussed him with the aural specialist who had performed the operation on him, I mentioned the fact that he could sing at first only from A to A^1 approximately. He remarked that these were the speech frequencies; and suggested that a possible explanation of the condition might be deafness above that point, over the range of the higher vocal frequencies. Against this view was the fact that in an early test I had played all the notes on the keyboard, and that he had said that all were distinctly audible. The surgeon said that his loss of hearing, which was in the left ear, was of a middle-ear type, and that it was due to a nasal sinus infection. He was interested in music and was most regular in his attendance at the lessons, only missing them if absent from school. The results fully justified the time spent on him.

(3D) The third of this last group also came to the school in 1946. He could not sing a tune and had a range which extended up to E^2. His voice was poor and uncertain. In his second lesson he sang tunes to 'loo' including 'Wenceslas', 'While

Shepherds Watched', and 'God Save the King'. He attempted, with fair success, a number of songs both to vowel sounds and to words, in the lessons following. Scale practice was a regular feature of his training and his range slowly increased. At the end of a year of somewhat intermittent lessons he could sing A^2, and was fairly satisfactory at the songs sung by his class; two months later he attained B^2, and reached C^3 a fortnight later still. This note was his highest, and he sang it quite comfortably. At this point lessons were discontinued. He had the very good range mentioned above; he could sing any song attempted by his class; and his voice, though quiet, was very pleasant.

He had had scarlet fever when five years of age, and in consequence his left ear had been perforated, and deafness in that ear had resulted. He had no catarrh or other affection of the nose and throat. I came to the conclusion that his deafness, amounting in all to an average loss of 40 decibels in the left ear, had slowed down the normal process of learning to sing by the imitation of others; and that he had been further retarded because he had not been allowed to sing at previous schools. He was not interested in music when he came to Acklam Hall, but his interest rapidly increased as he learnt to sing, and he bought himself a recorder on which he played with great enjoyment. He never missed a lesson if he could help it and was manifestly delighted with his progress

in singing. He was a most satisfactory pupil.

(4D) The fourth and last boy in this group, who was tested in September 1949, was found to have a very small range of from A to F^1. His vocal quality was very poor indeed. He had not been allowed to sing in previous schools, and as a result had at first little interest in music. He came from an unmusical home, but he himself was well-read, and had, I thought, the elements of culture in him. According to the specialist he had a similar affection of the breathing passages to that of the second boy of this group, and was suffering from perceptive deafness. The boy told me that he had had at various times six operations on the ear and nose; and was due to have one for the removal of tonsils and adenoids. This operation took place in October 1949. He returned to school in November and corrective lessons were at once started. In the first he sang only from A to C^1, a very small range indeed; but on being urged to sing as high as he could, to 'squeak' in fact, he located C^2 and was able to hold it. Next he sang from it down the scale to 'loo', and it was evident from the comparatively pleasant vocal quality that he was singing for the first time in his 'head' voice. His first song was 'Wenceslas', to 'loo', in the key of D; but he followed this by the first verse of 'The Trout' by Schubert, in the key of G, a very good performance for his first lesson. It was only possible to give him two further lessons in the term.

In these he sang 'Riding Down from Bangor' and 'Admiral Benbow' to words, almost perfectly, and in addition he increased his range to E^2 flat. He assessed himself at this stage as being in the B class for Interest in Music. His lessons will, of course, be continued. He is obviously very keen, and anxious to conquer the disability.

These were the most difficult cases. In only one instance was there a reasonable rate of progress. In all but very few cases the factors which hindered a quicker rate of progress, and which indeed might have been partly responsible for the condition, were, lack of sustained interest, and lack of musical surroundings; and it is moreover quite likely that the former might have been caused in many instances by the latter. It was from the attempts to cure the worst cases of singing disability that most of the methods leading up to a progressive course of treatment were evolved. One thing emerges with great clearness from these case studies. It is, that no matter how poor the voice may be, nor how hopeless the case may seem, there can be every prospect of complete cure, given time, patience on the part of the instructor, and sustained interest on the part of the child.

Chapter 6

CASE STUDIES (Continued)

In the present chapter will be described the treatment of those in whom Singing Disability was not quite so pronounced, but who lacked the ability to sing songs. Many of these children made a rapid response to the exercises given them, though some were slow to improve. They represent the average non-singer as found in the higher classes of the Primary Schools and in the Secondary Schools, with the exception of those who lack the upper notes of the register, who were discussed in Chapter 4, and those in whom the cause is definitely physical who are amongst those in Chapter 6.

The first two were very similar in initial equipment and in method of treatment. They came to Acklam Hall in 1940 and 1941 respectively. Each had a small range, no ability to locate notes, and could not sing tunes. One was lacking in self-confidence. Exercises in location were given at first; ascending scales to 'lah' were next sung; and finally songs were attempted, at first to 'lah', and later to the words. Progress was steady and uninterrupted in both instances, and within a few months (the exact time was not always noted in the early cases) they were able to sing the songs which the other boys of their year had learnt. Both were re-tested two years later and were found to be singing well in their treble voices.

They were followed in 1941 by two boys whose treatment was not completed, one because he left the town, the other because his progress was slow, and because at the time my experience was still small. The first was unable to sing, and was given location exercises, ascending scales to 'lah', and finally songs to the same syllable. He improved steadily, but left for another town after roughly a term's lessons. The other was in a similar condition at the commencement and received instruction of the same type. He progressed a little, but only very slowly, and as I had had about that time some depressing experiences with a few of his fellows, I discontinued his lessons. Later in his school life he was tested and showed distinct improvement, but I did not restart his training. It was a pity, as, in the light of later knowledge, I feel that a cure would have been possible.

A boy who came from the South of England proved an interesting and most satisfactory pupil. When he was tested on his entry to the school in 1941 he said that he had never sung, and had never taken part in singing lessons, but, instead, had always been allowed to read. He came from a good home and had a very artistic background. He had a fair range but very little control over location of notes, and no ability to sing songs. He was given the usual course of exercises in singing individual notes, in practising ascending scales to 'lah', and later in attempting first of all simple tunes and then more difficult ones to vowel sounds and later to words; and by the end of

his first term he was quite normal. He appreciated the work done for him and from that time forward enjoyed his singing lessons. At the end of his first year he was admitted to the Mixed Voice Choir and remained in it for the rest of his school life, which lasted for a further six years, singing first of all treble, then alto, and finally tenor. He also joined the Middlesbrough Musical Society, and sang in the tenor part of this choir. He proved to be an actor of considerable ability and was a leader in all cultural matters in the school; and I felt fully rewarded for the time and energy spent in opening the door to the appreciation of music and in particular, of choral music, which had hitherto been closed to him, and which might easily have remained so. His gratitude was very obvious. He was sensitive to criticism and I felt that the trouble had probably been due in the first place to some unfortunate remarks by adults, and that it had been perpetuated by the fact that he had not been allowed to try to sing at school. He had convinced himself that he could not sing, and, as a result, he was not able to do so. As soon as confidence was established, the corrective work was complete. This first impressed on me to the full the unfortunate effect of assuming that the vague and hypothetical condition of tone deafness existed in a child merely because he could not hold to the tune of a song; and I began to doubt the existence of any such deficiency.

In 1942 he was followed by a boy who was not highly intelligent but who was very willing to try to learn to sing. Lessons followed the pattern which by now had been fairly well established, location of notes, ascending scales to 'lah' and songs; and he progressed steadily. He reached a point at which he ceased to move forward. The lessons were discontinued and it was hoped the normal class singing would complete the cure. He was kept under observation and it was noticed that he gradually perfected himself, and developed a voice of most pleasing quality. He sang very heartily and very well. This was the first time that a boy who had not been completely cured before lessons were discontinued was able to perfect himself afterwards. It was noteworthy that he was not unduly sensitive and that he was always keen.

A boy who began at the Grammar School at the same time as the last mentioned, demonstrated fully the undesirability of preventing children from trying to sing. He had never been allowed to sing until three weeks before he left his previous school. He was, however, a young man of exceptional initiative, this being evident in several ways; and he had learned to sing in spite of the handicap. When he was tested he was rather uncertain in the location of individual notes but he could attempt a tune. He was given lessons for three weeks and at the end of that time he was able to sing without mistakes. He developed normally after that. Had he been allowed

to try to sing he would certainly have taught himself to do so years before he came to me. He was, of course, in a different category from any of those so far dealt with in this or the last chapter, for in hardly any case discussed could a cure have been effected without special training.

Another of that year's entrants might have taught himself to sing had he been allowed. He was from a good home, with musical and other cultural interests. He could not sing when he was tested, but he had a fair range of notes, and after weekly lessons on the usual lines for two months, he could sing perfectly. He was shy and rather sensitive. He began to study the pianoforte shortly afterwards and became a good amateur pianist.

In the following year 1943 a most interesting case came to me, a boy who had never been allowed to sing, and who seemed to have little range and no ability to locate notes or to sing songs. The Senior French Master, who used to take French songs with his classes, commented also on his inability to sing any tunes. He was given the course of treatment already mentioned and made very rapid progress. It was not long before I became aware that he was the lucky possessor of one of the loveliest boy's voices I have heard, with a quality quite out of the ordinary, though, it was, at first, rather lacking in power, as it had never been used. At the end of his first term he was singing normally; and after allowing him to sing with his class for a year in order to develop his voice, I admitted him to the Mixed Voice Choir. He was, of course,

delighted with his progress and success, and so also were his parents.

About this time the father of a boy aged ten years who was not attending the Grammar School, asked me to train his young son to sing. Both were members of the church at which I was organist, the father being one of the churchwardens. The boy was anxious to join the choir, but tests showed that he had only a small range of six semitones and was unable to sing a tune. He was given location exercises, scales, and hymn tunes to attempt, and within two months he was well on the way to being able to sing normally, and was admitted to the choir as a probationer. He was in due course admitted to full membership. I noticed that occasionally he forgot to sing and had to be reminded at first of his duties; but the phase passed, and he developed a good voice. He was later sent to Acklam School. There he was admitted to the Mixed Voice Choir, and in addition took up the study of the violin, becoming a keen member of both the School Orchestra and ~~of~~ the Middlesbrough Junior Orchestra. In the Wing tests he was found to have a Musical Quotient of 141, the highest of any boy in the Disability Group. He became one of the leaders of the Church choir and continued to be a member of it after his voice had changed. His father later expressed his gratitude for the fact that he had been taught to sing, saying that

it had opened out avenues of activity which were pleasant and healthy, and which had seemed closed to him. He felt, too, that the boy had been brought into touch with desirable companions and hadgained confidence in himself.

There were four such cases in the following year 1945. The first two had voices of small range, and they were not able to sing tunes at all. They were given normal exercises and their progress was very satisfactory; for they were soon able to locate notes accurately, they extended their registers upwards until these were perfectly normal, and they learnt to sing a number of songs. One of these boys left the town after a year's training and no check was able to be kept of his further progress. He was, however, virtually cured when he went away, and was in a position to maintain his newly gained ability. He had not been allowed to sing in his previous school, and his family were unmusical. The other boy mentioned, developed a pleasing voice and sang well. He, too, came from an unmusical family and had little initial interest in music on this account, though he had never been prevented from singing in class.

The third of the 1945 entrants of this type was unmusical and had no musical background. In the tests of Musical Intelligence he was found to be in the lowly D Grade. He had little range, a harsh voice, and no ability to sing songs. He progressed rapidly under normal treatment, of which scales and songs to

'oo' or 'loo' formed a major part, following the experience gained of its efficacy. The quality of his voice improved considerably and he was considered to be virtually cured before the end of the school year. Tests in the following year showed that, with the exception of an occasional tendency to 'talk' words which were attached to high notes, he was quite normal. A little practice rectified this. He said that he had thought his voice was too bad for singing; but he had not been prevented from attempting to do so by previous teachers. The fourth and last of this 1945 group was unable to sing, and had a range from B to C^2. He improved steadily, extending his range to F^2, and learning to sing perfectly songs which were within this compass. Two or three months went by and he was almost cured, when there appeared unmistakeable signs of the change in his voice. He was given a weekly singing practice to prevent regression; and, when a further six months had elapsed, his voice had sunk down and his lowest note was now C, the top one being rather uncertain. Lessons were discontinued, and he was told to sing tunes an octave lower than the true pitch. He seemed to do this as well as his limited range would allow, and it was hoped to restart his lessons at a later date if necessary. He did not appear to have much interest in music or any great confidence. Probably the early change of voice, which cut out his participation in the treble singing in his class, discouraged him.

Though I myself got little satisfaction out of his case, I have, however, arranged to restart his lessons, and hope to extend his register now that his voice is almost established. The year 1946 saw three people of this class come to the School. None of them had ever sung or been allowed to try to do so. They had ranges of moderate extent, all three being able to sing to about C^2 when urged to do so. Treatment was as usual, and a month after having begun it, they could all reach G^2 in their scale practice. They were normal boys, with unmusical backgrounds. One of them had, however, a cleft palate; and had had, in addition, an operation for tonsils and adenoids just before his entrance to the school. I was undecided for a while whether to include his case in Chapter 5, but as I did not consider that the trouble was due to the cleft palate, and as the actual voice was unimpaired by this abnormality, I did not do so. His answers to the questionnaire confirmed this; for he put down 'lack of interest' as the cause of the trouble and said that it was not due to anything connected with the vocal apparatus. His voice had never been commented on, but one teacher had not allowed him to sing, and he had convinced himself that he would never be able to do so. The second of this group was exactly like the first, both in background and in progress, except that he had no mouth deformity. The third boy had been allowed to try to sing, but had considered it impossible. There had

been little singing at home. The cause of the trouble in each case had been, I considered, a lack of interest in music. Lessons continued intermittently until the following June, with all three boys, by which time they could all sing classical songs such as 'On Wings of Song' and 'May Dew', and were all virtually cured, though their voices were not of first-class quality. Two of them, in the course of the following year, were given additional lessons, as it was found that their top notes needed further development. There was no sign of regression, however, though had the lessons not suffered from interruptions to their continuity, the boys would have recovered even more rapidly than they did.

In 1948 there was a great increase in the number coming to me for voice training and aural culture, as a number of children from the Middlesbrough Preparatory School were included in the group. The entrants to Acklam Hall will be described first. They were all eleven years of age. The three to be dealt with in this chapter include the boy who made the quickest recovery so far recorded. He had a very limited range and at first was quite unable to sing a song, but by the end of the first lesson was able to sing up to E^2 and to manage the first verse of 'Wenceslas' with the words. The following week he began by singing with ease up to B^2, and followed this by singing, with words, a number of songs with which he was familiar because he had often heard them sung before. He

improved as he went along. He had been completely cured in two lessons ! There was no doubt of his inability to sing at the beginning of his first lesson, nor of his ability to sing any known song at the end of the second. His musical quotient was 117, indicating a fair amount of ability. At the time, the rapid correction of the defect appeared inexplicable, but I realized later that I had never had such perfect co-operation with any pupil as I had had with this boy. He was intelligent, extremely interested, and most anxious to be able to sing. In addition, both his father and mother played the piano, and he himself had been having lessons for four years. When questioned on the reason for his non-singing he said he had heard people talking about his voice and had felt that it would never be like the voices of other boys.

The second of them was in the same form but was not so virile as the first. He reached B^1 in the test, and in the first lesson reached C^2, and sang half of 'Wenceslas' to 'loo'. In the second period he reached G^2, and in six weeks was able to sing B^2. He continued to sing simple songs and to do scales and location exercises, and seemed to be well on the way to a cure. His lessons were, therefore, discontinued, as I wished to see whether, having reached this point, a boy could complete the correction of the fault himself. It has

not, in this instance, proved successful as he has not gained any ground since then, and lessons will have to be renewed, if he is to be cured. He had had pianoforte lessons for one year before beginning school at Acklam. His self-grading for Interest is worthy of note: before the lessons began he said he disliked music; later he said he was 'Interested'. This initial lack of interest coupled with comments by people at home on his poor vocal ability which had given him the idea that he would never sing, were evidently responsible for his inability to do so.

The third was a slovenly sort of boy, who was slipshod in most of the things he did. He had not sung at all at his last school, and his first range was to E^2. He could not sing songs. His improvement was very rapid. Inside of seven weeks his range had increased to B^2 flat and his progress in songs was equally marked. At the end of seven months he was cured; and on being tested again after a year had passed from the beginning of his lessons, he was found to be singing well. He said that his home was not very musical, that his voice had been commented on both at home and at his previous school, and that one of his teachers had told him not to sing.

Of the children from the Preparatory School who commenced lessons with me in 1948, the first, aged eleven, came from a home that was not actively musical. She moved to another school after some six lessons and was not cured in that time,

but had increased her upper range from D^2 to G^2 and could sing simple songs. Her control over the high notes was not yet established. She had lacked interest at first, but this grew considerably in the six lessons. She had a poor singing voice. Tests a year later revealed that, in spite of the fact that she had done virtually no singing since leaving her first school, she had maintained the ground gained, though the quality of her voice had not improved at all because she had had no training. Lack of interest, of suitable environment, and possibly of musical intelligence, were the causes for her disability.

The second child, also aged eleven, suffered from lack of self-confidence. Again, adverse comments by grown ups had fostered this lack. When, through sheer nervousness, she had missed some notes, she had been prevented from singing in class. She came from a musical home and was herself a promising young pianist, who was very interested in pianoforte work. On first testing her I could find little wrong with her voice, except that she was manifestly nervous; but as the lessons progressed she improved. Her confidence grew and she was given only four lessons. Later enquiries showed that all was well with her. To encounter this kind of case is irritating, as this girl's chance to enjoy singing might have been ruined.

The third of these children, a boy aged ten, told me he had only just become interested in music. There was some music

at home, and he had a desire to study the pianoforte. He had not been allowed to sing. In the test he reached C^2 with an effort. In his third lesson he was singing A^2, and in the fifth, B^2 flat. He had a pleasing voice, and by means of exercises and songs had learnt to sing quite well by the end of his sixteenth lesson. His grade in the Wing tests was C. His voice ultimately became better than average and he began the pianoforte lessons he had wanted. He thought that his early lack of interest in music had been the cause of his defect.

Another boy at the Preparatory School, aged eight years, could sing from C^1 to C^2, the notes at either end of the register being weak. He had a good home, though it was not musical, and he had no personal experience of music at all, though he was quite intelligent. He was nervous. He needed a course of sixteen lessons to cure him, and his progress was quite steady. Scales to 'loo', and songs,were the materials used to train his voice, and his range was gradually extended until he could sing up to A^2. He had, in the sixteen lessons, learnt to sing, 'Loch Lomond', 'Polly Wolly Doodle', 'The First Nowell', 'Old Folks at Home ', 'John Peel', 'John Brown's Body', 'All through the Night', 'Camptown Races', 'The Poacher', 'God Save the King', and the inevitable 'Good King Wenceslas'. In addition, he had learnt some songs with his class in music lessons. The songs mentioned were regularly used for training purposes for younger children, and it was a frequent practice

to let little groups sing together, if they had all reached a fair state of proficiency. The trouble in his case was, probably, late vocal development, unmusical surroundings, and suggestions from one of his teachers that he should not sing in class. His musical intelligence was that of grade C. The next of these children, a boy, also eight years of age, who was not lacking in self-confidence, progressed slowly, owing to the fact that his lessons were irregular. Actually he lived some distance from the school and had to use an infrequent bus service. He was able at first to sing up to D^2, and his range was gradually increased until he could sing G^2. He was not able to master as many songs as the last pupil to be described and progress was not so satisfactory. There was some regression at a later stage, because of an absence due to illness; and though he recovered some of his range, and was finally able to sing songs within it almost perfectly, I was not entirely satisfied with the result. He left after the fourteenth lesson and went to another school. Later tests did not show any improvement. It was not possible to give him the Wing test, but I should estimate him as having a low grade of musical ability. The home had very little musical activity and no singing as far as I could tell. He was quite interested in light music and sometimes tried to play the piano, but had not had lessons. He was not of a

high order of general intelligence. It is difficult to say to what cause the defect should be attributed; probably, in the first place, to low musical intelligence, and in the second, to little singing at home.

Another boy, aged nine years, proved to have a good range, and a voice of pleasing quality, though he did not sing correctly. The usual songs and scales were sung by him, and after eight periods of instruction it was found that he sang perfectly, except for a tendency to rush the high notes of descending scales. He was given two further lessons and seemed to be singing quite accurately, and to have a good voice. A further trial a month later confirmed this; but his class teacher complained, shortly afterwards, of the fact that at times he 'droned' as before. Another prolonged trial of his voice followed; and again he seemed to be quite cured; but when I asked him to sing with others of the group, he suddenly began to drone in the middle of the song. On being spoken to sharply he pulled himself together and sang correctly. His teacher afterwards put it down to lack of concentration, a verdict with which I fully agreed; and she checked his tendency to let his mind wander from the work in hand by telling his neighbour to remind him by means of a 'sharp blow in the ribs' if ever he began to 'drone'. I was told that this proved entirely efficacious. He was intelligent, but babyish in his ways, and this may have accounted for his

dreamy attitude to all his work. The trouble was not due to an unmusical home, both his parents being instrumentalists. He himself had taken pianoforte lessons for a year before he began his voice lessons with me. He was in grade C of the Wing tests.

The last of the Preparatory children, a boy aged ten years, had no musical background, but was interested in the subject. He lacked confidence in himself. He had a fair range and could reach D^2 with an effort, but could not sing songs. He was virtually cured in seven lessons, but was so keen that he was allowed to continue for several more, in the course of which he was given exercises to improve his voice, and was taught several new songs. He was in the C grade of the Wing tests.

It remains to deal with the eleven children from the Primary School. No 1, a boy aged ten years, had little wrong with his voice when it was tested; and it was difficult to believe that he had ever been unable to sing, though he was sent to me as one who had a defective voice. He had a range of notes stretching from G to G^2, and all that was needed was exercise to improve voice production. In the fifth lesson he sang up to B^2. His voice lessons resulted in his being admitted to a prominent church choir in the town. The defect could only have been due to lack of concentration. He had a low I.Q.(89) but had a bright personality. He was, however, in the B grade

of the Wing Tests.

No. 2. A girl aged nine years also seemed to have little wrong with her voice. She sang easily to G^2 in her test. She was given three lessons and her voice seemed normal at all times. She added one semitone to her register. She had a nervous twitch and was inclined to giggle at the slightest provocation, but she was very keen on her voice lessons. Her defect must have been entirely due to lack of confidence, which could in its turn have led to the conduct referred to above. She was in the B grade of the Wing test for Musical Intelligence. She came from a musical home. In the Wing questionnaire she put herself in the A group for Interest, though she said she had not been very interested before her voice lessons began. Work has continued on her voice in order to train it and maintain her confidence in herself, and she is now singing quite normally.

No. 3. A boy aged nine years, who was sent for tests and treatment, proved to have an initial range of A to G^2. He sang, however, in a way that suggested he had rarely used his singing voice, which did, in fact, give promise of power and quality. It was, of course, very badly produced. He moved to another area after he had had four lessons; but these sufficed to add four semitones to his upper range, to teach him three songs, and to satisfy myself that if he were to sing a normal amount he would develop a really good voice. He came from a poor home and was without the necessary

musical background, a fact which probably accounted for his initial inability to sing. In addition he was lazy and undisciplined, and this would not help. I doubt if he will go any further in the matter.

No. 4. Another boy aged seven years, who also left the district after his fourth lesson, progressed well, though not as far as No. 3. He had an initial range of C^1 to A^1, but in the last lesson sang up to E^2, and also sang 'Wenceslas' and 'Away in a Manger' reasonably well to 'loo'.

No. 5. This was a boy of seven years who left the area after his fifth lesson. There was little wrong with his voice for he sang up to G^2, though he was nervous and shaky in the top notes. His history was interesting. He came from a very good home and was related to a large family, very well known in musical circles in the town. They were, in general, very competent musicians, and in addition were not tolerant of incompetence. I came to the conclusion that the boy's early vocal efforts had been remarked on in his presence and he had never recovered from this, for though he had the elements of a good voice, he had also a firm determination 'not to like music'. I felt that that forcefulness which was universal in the family, was in this case working against music and not for it.

No. 6. A boy aged nine, from a good, though not a musical home, made very good progress and was cured in twelve lessons.

He was sensitive and keen, was in grade C for Musical Intelligence, and was in the B group for Interest. His range increased steadily, as did his singing ability, and in the twelfth lesson his range extended to B^2, and he could sing tunes as well as any other member of his school class. He was a very good pupil. I suspected slow development of the power to sing when he was very young, and adverse comment later, for he said one of his teachers had told him not to sing.

No. 7. A girl aged nine years managed, after trying very hard, to sing up to E^1. She had not been able to sing tunes, and her voice was very thin and poor. She made a fair attempt at 'Wenceslas' at a lower pitch than the usual one, as she was not able to use any high notes in a song. Little progress was made for three lessons, but in the fourth although she could achieve only D^2 in her scale practice, she proved to be much better at locating notes in songs, and attempted two more simple tunes to 'loo'. Progress, particularly in the ability to sing songs, was steady; and after eleven lessons her voice had become very sweet, and possessed a quality quite out of the ordinary. It was easily one of the most attractive voices in the school. Her range had not increased as much as was hoped, for she could sing G^2 only with difficulty; but lessons continue, and it is hoped that she will add a few extra notes to her register. She is sensitive and rather shy. Her Interest group at first was C, though after

a number of lessons, it improved to B; and her Musical Intelligence group was C. Her home was not unmusical, she herself having had pianoforte lessons for two years. She said that she played for pleasure. I feel that, being highly sensitive, the child had reacted to the suggestion that her voice was not like other children's voices, and singing had become difficult for her.

No. 8. A boy aged nine, who was not very intelligent, was in the C grade of the Wing tests. He did not like music, had no background of music in his home, and had never been able to sing any songs. He managed in his first lesson to sing with great difficulty up to C^2. He also made a fair attempt at 'Wenceslas'. Normal instruction led to his attaining B^2 in his fifth lesson, and he gradually learnt to sing songs, first to 'loo' and later to the words. He was almost cured by the time he had completed ten lessons; but these continue, as he is capable of producing better high notes than he yet does.

No. 9. An eight-year-old boy came from a very musical home but was not himself studying an instrument. His Wing grading was C. His Interest group after a number of voice lessons, was B. He was a spoilt, unruly child, who was a nuisance when others were in the vicinity, as he distracted their attention and hindered their progress. In his first lesson he reached, with difficulty, to C^2, and made a very poor attempt at 'Wenceslas'. He was familiar with very few tunes indeed,

and this made progress rather slow for a time. He did improve, however, in spite of this handicap, though the quality of his voice remained shrill and rather poor. Steady work produced results, though his upper range was variable; sometimes he would reach G^2, and the following week he could only get up to E^2. His ability to sing songs gradually improved. Treatment is still in progress, and, given time, he should be a competent singer, though he will never have a good voice. I think that a poor natural voice has been his trouble throughout. He had not been allowed to sing at school.

No. 10. A boy aged ten years could in his test sing middle C only, and was, of course, unable to sing songs. In his second lesson he reached D^2, a great improvement. In his third, he sang 'Wenceslas' to 'loo' almost perfectly, and from that time continued to progress steadily. He left the school at the end of the school year, having had ten lessons; and the position was that he was able to sing up to F^2 sharp, and could sing songs like 'Strawberry Fair' quite well to 'loo' and 'lah', though not quite so well when he used the words. If he is not subjected to unnecessary comment, he may complete the cure for himself, though this is by no means certain. He has gone to a Grammar School where there is little music; and he is too far away for me to continue to give him tuition. He was in B group in the Wing tests and C group for Interest. He came from a musical home and had studied the pianoforte for one year. His voice was

completely undeveloped and I was at a loss to account for it. Perhaps, unthinkingly, some member of his family had discouraged him from trying to sing.

No. 11. A girl aged 10 years, a sufferer from asthma, was brought for voice exercises some time after the others of this group had started lessons with me. She had a range of from G to G^2. though the seven semitones at the top were very poor and undeveloped, and she was not able to sing a song. Scales and the gradual learning of songs improved her voice production so much, that after eight lessons she was completely cured and sang quite pleasantly. Much absence because of her complaint, and a chesty condition not conducive to vocal effort, were partly the trouble. In addition, her home was not musical, and she did not herself play, or wish to play, any instrument. As soon as her voice production had been improved by scales, and she had gained confidence in her ability to sing songs, she had no further trouble. Her Wing grading was C, and her Interest, C before her lessons, and B when they were completed.

The work on the above children from the Primary School was begun in January 1949. I have not grouped them in age or sex, but have recorded them as they were sent to me.

(5D) In 1949 there was only one case of voice defect among the summer entrants to Acklam and I am including him at this point as he is the last of my recorded cases of school children to date. When tested he said that he had never

been able to sing with his class; he was obviously afraid to do so. He got down to C and up to G^2 in his first range test, though he needed much encouragement to attempt the higher notes. His low notes were thin and quiet. At first I wondered whether I had at last found someone in whom the trouble was caused by a low natural register; but this idea was soon dispelled by the manner in which his upper notes gained strength as he sang scales. In the second lesson his upper notes developed considerably, and he reached B^2 flat. He was also able to sing 'Admiral Benbow' first to 'loo' and then to the words, though this last achievement came about only after some effort, accompanied by encouragement. He was given a few lessons after this to ensure that the improvement was not checked, but he continued a perfectly normal singer, and developed the power of his voice by singing in class. Some weeks after I had discontinued regular lessons I tested him again for range. The upper limit was as before, but he had lost the four lowest notes in his vocal span and could only, with difficulty, sing E. He was in the A grade for Musical Intelligence, was in the B grade for Interest, and he came from a musical home, his brother being a good singer and a keen pianist. He himself had studied for two years, and said that he played for pleasure. I have wondered if, in the first place his voice suffered by comparison with a good voice in the family.

Two further cases will be mentioned in this chapter though

neither case was a child. The first was a young curate who, in 1942, came to the church at which I was organist, and could not sing in tune at all. He was about twenty-five years of age, was extremely nervous and diffident, and seemed to have little self-confidence. He was not able to sing any part of the Anglican Service satisfactorily, and was uncertain of hitting any note he was given. His voice was of quite high pitch and he seemed to have a natural reciting note, the A below middle C. To sing anything below this was for him very difficult. If he hit this note when he was given it, all might possibly be well up to a point; if, however, he fixed on a note a semitone higher than this note, he resolutely sang through the service a semitone too high, even though all the responses were played and sung in the correct key. The setting of the Responses for Evensong was that in D by T. Tertius Noble, and the reciting note was actually A, though as this was rather high for congregational singing, it was the custom to transpose a tone down into G, for the section following the Creed. It was in this lower second part of the service that most trouble occurred at first. The Communion Service mostly used was the setting by Merbecke, and he could make no attempt at this. He was considered 'tone deaf' by the choirmen. A course of scales was my first step with him. This strengthened his voice in general, and developed the lower part in particular. In addition he sang numerous hymns which he attempted quite well. Most of his efforts,

were, naturally, directed towards learning to sing the priest's part of the Merbecke Service, and little by little he became fairly proficient. At a Children's Service every Sunday, this setting was sung, and it provided an opportunity to try out his newly-acquired ability. At first he was nervous, and made mistakes which he never made in his private lessons; but his confidence grew, and he steadily improved until he was quite reliable and competent. The final step was to let him sing the service with adults in attendance and this he did satisfactorily. As he became more sure of himself, his singing of the other services improved accordingly. To make it easier for him I took the full Evensong setting in A, not partly in G, and this helped very much. This went on for a long time. One evening, quite without thinking, I reverted to the previous practice and gave G for the second part of the Service which follows the Creed. I wondered what the result would be; but he now sang it perfectly in the lower key, and continued to do so in the following weeks. His voice lacked tonal quality; but whereas at first he could hardly sing anything, now he could sing the priest's part of the various services, unaccompanied, and satisfactorily. He was very fond of music, and was a regular attender at the best orchestral and vocal concerts in the area. I put the cause of the trouble down to an unusually great lack of confidence, and to excessive shyness. An interesting feature was that I found him much more difficult to improve than boys are as a rule. He was

less resilient, and preconceived notions were very firmly fixed, and more difficult to alter.

The other adult was a neighbour aged thirty, who, having heard of my success with one of the boys already mentioned, asked me if I would try to teach him to sing. He had always been looked upon as a non-singer or grunter. He came from a cultured, but non-musical family, and had probably heard very little singing before his schooldays began. He had married a lady who was an accomplished singer and pianist. His voice was tested and he seemed to have a high baritone quality. He sang from C to E^1 and had no difficulty in doing so, but his voice was very quiet. He made steady progress and increased his upper range to G^1. Classical songs of suitable range were taken and he had no difficulty in singing them; but his voice was quickly tired, probably owing to the fact that he had done nothing of this sort before. He continued for several months, more for the sake of voice development than for anything else; for, as far as I was concerned, he was cured in a few weeks. The problem of building up his confidence, however, was more difficult to solve than that of getting him to sing. Boys can try out their newly-gained ability daily in the hymns, and several times a week in singing lessons, and as a result they build a foundation of confidence which is rarely shaken; but an adult is not so well situated, and, in addition, he usually has memories of adverse comment, and the self-suggestion of

years to battle against. He left the district soon after this, and I should not like to guarantee that he would get the necessary practice and encouragement to ensure a lasting effect.

These formed, as it were, the bulk of the cases of disability. The records usually go only as far as the end of the treatment, but the effect is felt throughout school life, for singing does not stop with the change of voice, and all boys in my own school continue to sing during and after this period. The boys mentioned in this chapter have the same experience as the others, and come through it in the same way; one or two of them have had some difficulty in settling down after the change because of a temporary lack of ability to control the voice in a satisfactory manner, and have received help. In no case has a resumption of regular lessons been necessary, however, once a cure has been fully established.

Chapter 7

CONCLUSIONS

From the mass of statistics and case studies certain facts emerge and certain conclusions may be drawn from these facts. They relate to tone-deafness, to the part played by physical defects and organic disease, to the effect of homes where there is little singing and where music is not one of the family interests, to the psychological effects of criticism and of not allowing children to try to sing, to the incidence of musical intelligence, and to the value of encouragement and persistence. The cases tested covered a wide variety of children of ages ranging from seven to eighteen years, from three types of schools, with I.Q.'s of from 82 to 140, and forming approximately six per cent of the total population of those three schools taken over the whole period.

The results of the tests of Auditory Differentiation disclosed that not one of the non-singers was unable to differentiate between sounds in a normal way. In addition they could all detect a difference of a semitone in any part of the pianoforte range. For these children, at any rate, inability to distinguish between notes a semitone apart was not a cause of their inability to sing. No children of subnormal intelligence were tested. It is possible that they would not have managed to do the tests because of lack of understanding. It is of interest that the matron of a large colony of mental defectives, situated at Epsom, told

me that her children could sing in groups, but that the overall level of pitch of the songs rose and fell as they sang on. This must have beendue to lack of intelligent concentration, which is always necessary for accurate singing. I do not consider that it would be caused by defective ears. The same lack of concentration would quite probably mean that many children of this type would be much slower than normal children in learning to sing, and would almost certainly be looked upon by many as vocally defective, or as tone-deaf. With regard to the widespread idea that there is a condition of tone-deafness analogous with colour blindness, a little consideration will show that this is impossible as there is little real similarity between the ear and the eye. The waves which stimulate them are, in the first place, quite different. Then, the ear has a spiral-shaped organ, the cochlea, every part of which seems to respond to a different tone from any other part. In the eye, however, the two detectors, the rods and the cones, exist side by side in many places, though at the fovea there are no rods, and in the outer parts of the retina, probably no cones. As a result, there are two distinct types of vision, chromatic and achromatic, to which there is no parallel in hearing; for it seems that there is but one type of detector in the ear, and that within limits there is a sensitive point on it for each of about 1800 frequencies.(10) It is therefore impossible to have hearing without differentiation. It is true that

the ear can be deaf to certain tones, but this means simply that it cannot hear those tones, not that it can hear without differentiation. An extreme case of this was recently brought to my notice, when a person who was deaf to all but tones of high frequency, complained that she did not like to go to church because all she could hear were the 's' sounds, and they became irritating after a short while. This is true tone deafness of a particular type.

It is possible conceive of a cochlea with far fewer, and with more widely-spaced units of reception than is normal, or with an insufficient number of neural connections; but the point here is that in none of these cases of singing disability was there any indication of the existence of such a defective organ of hearing, and that if there are people with this type of defect, they must be very, very, rare indeed. I have not heard of one.

Of the writers quoted in Chapter 1, all, except Hooper, assume the existence of tone deafness, and consider it to be a cause of the disability. In only one book, that of Mrs Curwen, is the condition defined. She does not use the term 'tone deafness', but uses the definitive words, 'in whom the sense of pitch seems altogether wanting - who cannot imitate a sound or tell whether a series of sounds goes up or down'. Presumably this is what they all mean. Children need to be taught the meaning of 'up' and 'down' in matters of pitch, and not all of them learn to apply their knowledge readily,

any more than they will always turn to the left on being given the order 'Left turn', though all of them know 'left' from 'right'. The imitation of a sound, too, is something which has to be learnt; but the fact that a child cannot do this does not necessarily indicate lack of a sense of pitch. There was, it is true, a very slight difference between the means of the Experimental and Control Groups at both levels for Differential Sensitivity, and that in each case it favoured the Control Group; but it was not significant, and the similarity of the means and σ 's, and the lack of any significant positive coefficient of correlation between Differential Sensitivity and Range, suggests that auditory differentiation and singing ability, or disability, are not related. It is stated more than once, in the writings mentioned, that only one child in a hundred is tone-deaf; but a due consideration of all the facts indicates that even this is an exaggeration, and that the condition of tone deafness is, in the popularly accepted sense of the term, non-existent.

On the subject of lack of synchronisation between the ears, the tests were conclusive. There was no evidence of any such defect amongst those members of the Experimental Group who were tested. It was not considered likely that there would be, as every one of them had previously been able to sing at least an easy song, in tune with the pianoforte, and such a trouble would have manifested itself in some way when the child began to sing. The cases reported in 'The Musical

Times' and quoted in Chapter 1, were in all probability due to a catarrhal condition of the middle ear; but it seemed that the trouble might sometimes be caused by a complaint other than catarrh, which might not have proved so amenable to treatment. In any case the possibility of this being a cause had to be investigated.

To diagnose the actual cause of the disability amongst those who had real or suspected aural and vocal defects, was difficult. A general audiometric survey disclosed five children of my group who had hearing loss. Four of the five were subjected to a pure-tone audiometer test.

The results of these tests have only been made available during the past week (23rd February 1950), and as it is impossible to include them in the chapters concerned with those cases, they will be discussed at this point. They will be referred to in order of appearance in those chapters in the following manner:

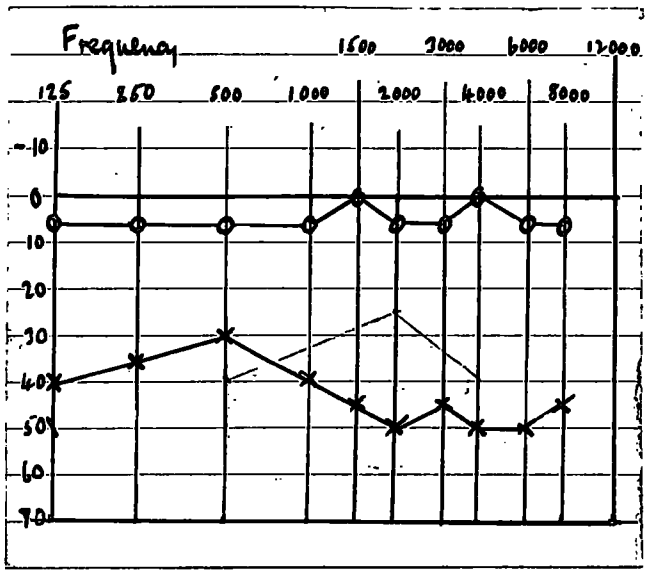
1D (page 84); 2D (page 89) etc.

1D (page 84). This boy was of limited intelligence, and his audiogram was, on this account, considered to be very unreliable, and will not be inserted here. I did not suspect hearing loss before the survey was made. This test gives him a loss of 3 decibels in the left ear, though the average loss was probably more than this. It does not affect him, however, as he hears well for normal purposes; and I do not think that it can be considered in any way a cause of his inability to sing.

2D (page 89). This boy was absent when the pure-tone test was taken. The group survey reported him as having a hearing loss of 2 decibels in the left ear, though the loss was fairly obviously greater than this. The aural surgeon who had operated on him for the catarrhal condition said that he had deafness of the middle-ear type. I saw no reason for modifying my previous conclusion that catarrh was the cause of his singing disability; for, once this was attacked, his recovery was rapid.

3D (page 91). This boy had a fairly normal right ear, and an average hearing loss of about 40 decibels in the left.

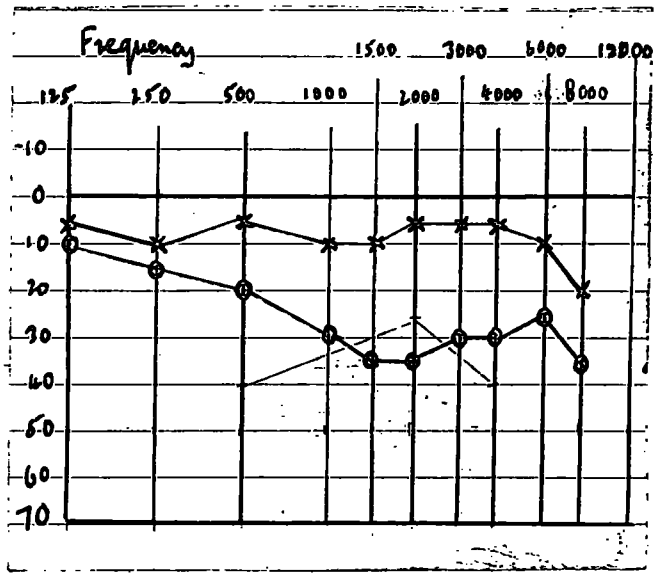
Audiogram



My previous conclusion, that slow learning together with criticism (implied, because he was prevented from singing) were the causes of his disability, was strengthened. Probably the hearing defect was the cause of the slow learning.

4D (page 93). This boy had a slight defect of about 5 decibels on the average, in his left ear, and a greater loss of approximately 25 decibels in the right, the loss being greatest in the speech frequencies. He had middle-ear deafness, catarrh due to a sinus infection, and enlarged tonsils and adenoids (which were removed).

Audiogram

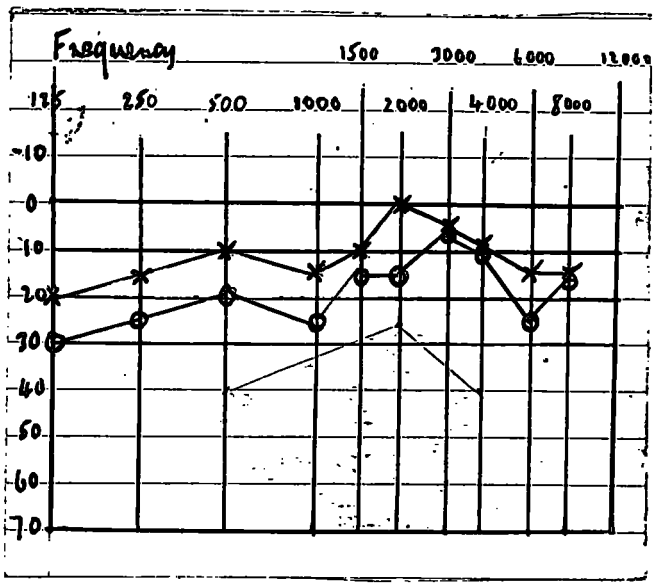


His trouble was probably due to a combination of all his complaints. At the time of writing he is making good progress, his greatest handicap being catarrh.

5D (page 117). This boy was not suspected of having defective hearing before the audiometric survey. His audiogram from the pure-tone test shows that his average loss was about 10 decibels for the left ear, and 15 to 20 for the right. It is noteworthy that his hearing is best in the speech frequencies, reaching normality in the region of 2000-3000 cycles. This together with the fact that he sat in the front row of his class would account for my overlooking

his defect.

Audiogram



o = Right ear
x = Left ear
Red shaded portion represents critical area for speech loss

I considered that he had been unfavourably compared with his brother, who had a good voice. Probably this had occurred because of slow learning due to the hearing loss.

There were several boys and girls in whom the trouble seemed to be due to some peculiarity of the vocal apparatus which which made it difficult for them to sing any notes of medium or of fairly high pitch. I have been able to find scarcely any literature which deals in a factual and objective way with the physical effects of shouting, or incorrect use of the lower jaw, or of wrong methods of producing the voice, and can therefore only give my own opinions on these matters. It seemed to me that three of those who came under my care had learnt to speak in a crude and unpleasing manner because of their environment, the 'thick' mechanism of production, not the 'thin', having been the only one used. If one causes one's lower jaw to protrude, and then tries to sing

up the scale, one finds that high notes are not easy to sing, and that those produced are chesty and disagreeable. One of them was cured and was taught to sing in a respectable manner; but the other two have been amongst my most difficult cases, not because they lack interest, but because of the difficulty of making any impression on their ingrained habits in one weekly period of from ten to fifteen minutes. At the time of writing they are showing signs of improvement in tone production and range which lead me to hope that persistence may ultimately reap its reward. A few others, who were difficult cases in this respect, had not learnt to sing with the thin mechanism. The sound 'loo' was at the root of the successful treatment in all these cases.

How is one to diagnose the trouble where a girl who could not sing, learns to do so, develops a voice with a delightful soprano quality, but in spite of much practice fails to get beyond E^2 ? It can only be due to a defect in the voice mechanism; but without apparatus to photograph her larynx and throat it is impossible to say more. Persistent effort corrected a similar defect in another case, and work will, of course, continue in this one, so that in a year's time it may be possible to say that she can sing notes which at present are not in her register. It would be helpful, however, to know just what the defect or malformation is.

The cause of most of the trouble was, primarily, slowness in learning to sing, due very often to unmusical homes, or to

lack of interest, or to both; and this had usually been aggravated by criticism, spoken or unspoken, of class members or of adults, including teachers. No child sings by nature, for singing is, like speech, an art acquired by the imitation of others. Those born with a high degree of musical intelligence and who are fortunate enough to live in a musical home, may, and frequently do, learn to sing in the first two or three years of life. The process takes longer with those who are neither so well equipped nor so fortunately placed, but it occurs just the same. Boys and girls of this type are frequently unable to sing when they begin to attend school at the age of five years, and their learning process begins there. Where there is a wise tolerance of the 'joyful noise' made by these children in singing lessons, they gradually learn to control their voices and to sing in tune; where, on the other hand, objection is shown to their efforts, progress is at once hampered. The majority of children are not unduly sensitive, and if their singing activity is interfered with, the net result is, as a rule, merely that their progress is made slower than it would otherwise have been, because of fewer opportunities to try to sing. Where, however, the sensitive child is treated in this way, there is the possibility that the idea may be implanted in his mind that this activity is one for which he is not equipped. Once this is firmly fixed, no amount of listening to others or of instruction to imitate others will have the slightest effect. He is as

incapable of singing as if his vocal cords had for some reason ceased to function. Sixteen of the thirty-five children who answered the questionnaire to find out causes for defect gave 'comment on the voice' as one of the causes; and twenty-six had at one time or another been prevented from singing by a teacher.

Criticism is not, of course, entirely from outsiders. Self-criticism can, in extreme cases, have the same effect. Where a child has, for some reason, been slow to learn to sing, it is possible that he may be self-conscious about his voice, and may without outside assistance arrive at the conclusion that he is not able to sing. Self-criticism may be reinforced by external criticism.

In two cases, lack of interest was found where the child had a sound musical equipment and a very good musical home. This was, I consider, due to the fact that too high a standard was set him in his tender years, and that, as a result, he acquired a dislike for, rather than a lack of interest in music, which produced the same effect.

Another cause, which though rare, does exist, and is bound up with lack of interest, is that of laziness. I do not think it is usually a primary cause, but I can recall at least two cases in which it played a part. They needed to be firmly handled. Akin to laziness, though not quite the same, is lack of concentration. At least four instances come to mind in which this played a part, and in one of them it was,

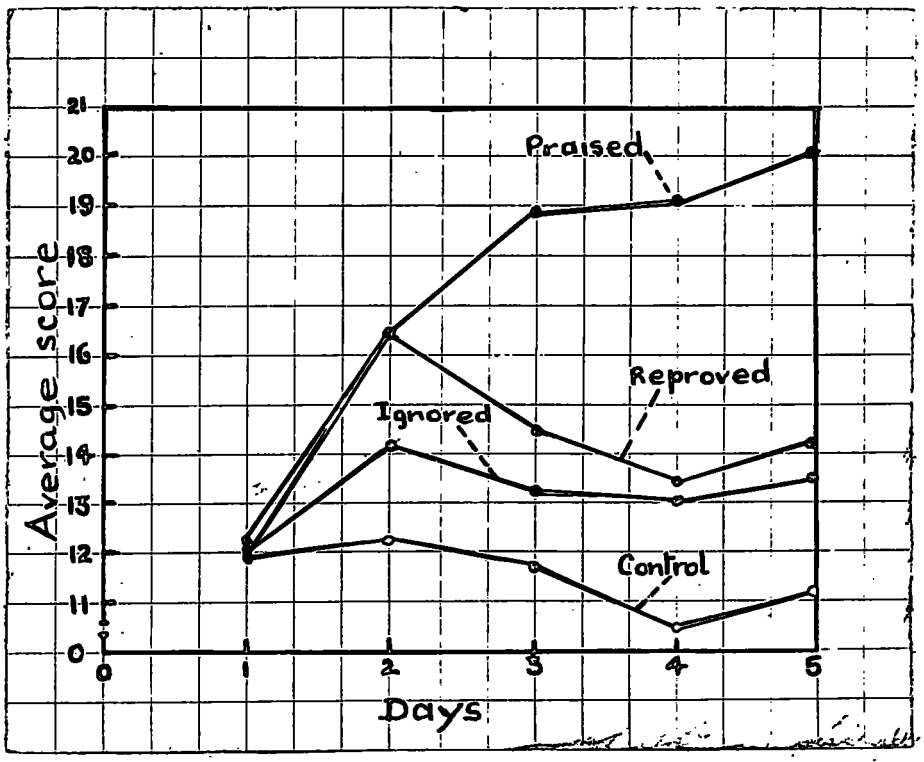
on occasion, the cause of regression long after the boy had been taught to sing perfectly. Even if a good singer allows his attention to wander, his singing suffers, and he may even go out of tune. When a child, who has just learnt or is just learning to sing, does so, the effect is that he 'drones'.

The significant coefficient of correlation between M.Q. and Range of 0.47 for the combined group of 70 children, is very interesting, and suggests a connection between the disability and lower musical intelligence. It is likely that it is a predisposing factor; for, where musical progress is slower, as it is bound to be with lower intelligence, interest is not so likely to be aroused, and this may set in motion the various circumstances which lead first of all to late vocal development, and later still to the feeling that singing is impossible. The first essential in such cases is to stimulate the child's interest in music, a task which is not, as a rule, difficult of accomplishment.

In every instance where a possible cause of the trouble has been discussed it will be noticed that an accompanying psychological condition has been discussed also. This was present in all cases, and whilst not usually a primary cause of inability to sing, was probably the greatest single cause of the development and fixation of it. When it is impressed upon a child that he 'cannot' do a certain thing, he develops a feeling of inferiority where this is concerned, and this is

the main difficulty with which the instructor has to contend. He must counteract this feeling by concentrating on persuading him that he 'can' sing.

Of pertinent interest in this connection is the account of an experiment by E. B. Hurlock, entitled 'The evaluation of Certain Incentives Used in School Work', described in the "Journal of Educational Psychology 1925," Vol. 16, page 149 (9). Part of it was concerned with the subjects of praise and reproof, and their effect on children's work. Four groups of schoolgirls were equated for age, and were given the task of solving as many as possible of thirty arithmetical problems in fifteen minutes. A similar test of comparable problems was given on each of the four following days. After the tests were over, one of the groups was vigorously reproved for careless and poor work. The members were not told how many they had done correctly or incorrectly. Another group, regardless of how well or ill it had performed, was praised for its good work. A third group was allowed to listen to the praise and reproof of the first two groups, but was itself not referred to at all. The fourth group did its work in a room apart from the others and received neither praise nor blame. This procedure was carried out on each of the five days. The results are shown in the following diagram:-



Effect of Different Motivating Conditions on Solution of Arithmetical Problems

(Drawn from data in Hurlock, E.B., Journal of Educational Psychology, 1925, vol.16, p.149).

All four groups were approximately the same in the first test, as was expected. On the second day the praised and reproved groups were still level, and both increased their scores. From this point, however, the praised group improved, and the reproved group became worse. Neither of the other groups showed much improvement.

This illustration of the value of praise, and of the negative

effect of reproof, is very illuminating. There is, of course, no suggestion that deliberate reproof is ever given to a child who cannot sing; but criticism, though not so strong, can have a similar effect in the long run, and should be avoided with children where their voices are concerned, except, of course, when necessary in the matters of diction and tone-production with established singers.

It is, indeed, not an exaggeration to say that in nearly all instances where the defect is found, the principal trouble is that confidence in the ability to sing is lacking; and the main problem is, therefore, that of creating this confidence and in maintaining it. It is difficult to give rules for this, as it is so much a matter of experience. It is gained, of course, by success in the singing of notes and phrases that have never been attempted before; and is inculcated by the lavish use of sensible praise on the teacher's part, that is to say, praise so worded, that it is convincing; and by the avoidance of criticism of anything except laziness. In no circumstances whatever should the word 'cannot' be used; it breeds an atmosphere of defeat. All comments should be constructive, and should serve the main end,-the creation of self-confidence and of a feeling that success is certain. If a child loses interest and becomes lazy as a result, he should be told that he will lose ground if he continues this way; and this, coupled with the suggestion that it would be a pity to fail to learn to sing well when he has almost

succeeded in doing so, will probably have the desired effect. In the last resort, a firm insistence on effort will certainly do so.

The views of several writers who have at various times referred to the subject, are quoted in Chapter 1. I have, in another place, discussed the views expressed about tone deafness. Mrs Curwen does not attempt to diagnose the trouble; but, having stated that it exists, she goes to considerable lengths to indicate how she would deal with it. Her methods seem to be quite sound, based as they are on the use of tonic solfa. She lets the child fix his own 'doh' if necessary, and encourages him to sing short scale passages, later allowing him to attempt skips. The singing of simple exercises follows. Beyond this she does not go. There is much to be done after this stage is reached, before one can feel that the disability no longer exists; and furthermore, she does not touch upon the subject of development of range, which, in my experience, is very important. She does, however, underline the need for encouragement, and rightly criticises the irresponsible suggestions given to some children that they cannot sing. Whittaker's views were certainly worthy of wider publicity than they in fact received. No reference to the book was made by any of the writers already mentioned, and the fact that several of them unquestionably postulated the condition of tone deafness seems to confirm that they, at any rate, had not read the book. Environment is certainly a potent cause

of vocal deficiency in that it is the cause of retarded learning, and of lack of confidence where criticism is present. His observations regarding the suddenness of the acquisition of control over the upper notes are borne out by my own experience, though I do not consider it strictly correct to divide the voice into three registers but rather into two - that where the 'thick' mechanism of production is employed, and that where the 'thin' is used, the latter being the one which is acquired all at once after preliminary practice. The additions to the range which occur after that, are due, in my opinion, to an increase in ability to use the 'thin' register, which is gained by practice.

I am not in a position to comment on his view that mothers are more likely to sing to babies than are nurses, though I agree that the mother does play a very important part in the development of the child's ability to sing.

Hooper gives four main causes for the trouble: that of deafness, disease, or defect of the vocal apparatus; non-finding of the singing voice due to lack of musical environment; faulty listening due to lack of interest; and lack of control of the vocal muscles, due to inability of the ear to give critical correction. Total or nearly total deafness must, of course, render singing nearly impossible, just as speech in such circumstances becomes difficult to acquire. The present investigation does not include such special groups.

I have, however, heard a carol party at a school for the

deaf singing with remarkable accuracy in some cases, though this was where the defect was not total. Singing can take place, and under enlightened instructions does, in such circumstances. Of the seventy-nine children who came under my care not one was in this category or anywhere near it; only five had defective hearing, the worst case having an average loss of 40 decibels in one ear, the other ear being virtually normal. Four of them blamed, in part, this hearing loss. In all but one instance their non-singing had been the subject of remarks, and in three cases they had not been allowed to sing. The fourth had probably never tried, and prevention had thus not occurred.

In three of these cases hearing loss appeared to play a part, though not one which presented insuperable difficulties.

It is noteworthy that when the audiometric survey was carried out on all the 450 children of the Primary School, eight were reported as having hearing loss. Seven of the eight were normal singers; only one of them was in the vocally defective group. This tends to confirm my opinion that hearing loss in itself need not be a cause of inability to sing, and,as a rule,is not, though where complicating circumstances like catarrh or lack of special consideration occur, it may, very occasionally, be one of the causes. Of the three schools concerned, the Primary School is only one where the group survey has so far taken place throughout the school. As time was pressing,a special survey was made of as many of

the other vocally defective children as could be contacted at short notice. It is not therefore possible to make this comparison except for the Primary School; but my own observation fully bears out the conclusions drawn, that hearing loss which is not great enough to prevent a child's attendance at a normal school is not as a rule a cause of singing disability.

With Hooper's conclusion that the cause is often simply that the child has not found his singing voice, I fully agree. At one period in his life it is almost certain that everyone is in this category; prolongation of it is, as he says, often due to environment. The remedy suggested, that of contact with and imitation of normal voices, is the correct one; but care must be taken that this happens without any attention being called to the fact, as self-consciousness and a feeling of 'difference' are potent causes of trouble. I have come to consider young children of this type as examples of rather late normal development and not as true non-singers.

Lack of interest is certainly a cause. I should suggest that lack of effort arising from this is at least as much a cause as faulty listening, though, of course, laziness may be at the root of the trouble in the second case as well as in the first. I doubt whether it is at all affected by ability or inability to recognise changes in pitch, and whilst I use visual impressions of pitch very frequently, they are usually to direct and encourage children who are striving after notes

that are still beyond the vocal compass, or which have only recently been achieved and which are not fully under control. Children recognise changes in pitch, but the artificial distinctions of 'high' and 'low' applied to pitch, have to be acquired like many other things, and this certainly will be more quickly done if visual signs are used.

I consider that lack of control of the vocal muscles is virtually the same as the non-finding of the singing voice; but I feel that, in older children at any rate, it is due to a pyschological state, following slow learning which has been accompanied by self or external criticism, rather than to the lack of a critical ear, as Hooper suggests. As a result of this no attempt is made at singing; and it becomes virtually impossible, until the child is made to try to do so, and acquires a confident attitude, following success and encouragement. A very difficult case with which I am engaged at the present time can always tell when he is out of tune, though his control of his voice is not yet sure, and he often overshoots or falls short of the note he hears and wishes to hit.

His remarks on the ill-effects of a critical class are to the point; and my own view is that the smaller the amount of notice taken of faulty singing, the better for all concerned. It is certainly necessary, and usually possible, to snub the child who will pass remarks about other children's singing.

Priestley and Grayson refer to the 'difficulty and annoyance' which 'ghosts', 'growlers', or 'grunters' cause to the infant-class teacher. This is very true,but it is a great pity that it is so. The teacher herself was a 'grunter' at one period of her life. She probably, however, was not told so, and nature with her would take a normal course, and she would learn to sing in much the same way as she learnt to walk. One must guard against the spread of an attitude like this,as it is productive of harm, which is intensified if such a teacher remarks on the disability in the hearing of the children, and rendered still worse if she prevents their trying to sing. These observations apply equally to parents, who, in all probability, are much more apt to comment than are teachers. It should be realized that learning to sing is a normal stage in human development which, because of environment, may occur later than learning to speak.

In addition to deafness the writers consider, a slow ear, a delayed development of the nervous mechanism controlling the muscles of the vocal organs, and a weak memory for musical sounds, as further causes of the inability to sing. The term 'slow ear' is not defined, but it is probably much the same as Hooper's 'Inability of the ear to give the necessary critical correction'; and 'The delayed development of the mechanism controlling the vocal' organs is the same as the fact that the child 'has not found his singing voice'. These

subjects have already been discussed.

To examine the view that a weak memory for musical sounds is a cause, the means of the test of Memory in the Wing tests were found for the Experimental Group of forty-five and for the Control Group of a similar number, who had been equated with the former group for age and intelligence. The mean for the Experimental Group was 10.2 (out of 30); that for the Control Group, 14.9, the difference being significant at the 5% level. This indicates that there is a connection between the two; probably that a poor musical memory is one of the causes. It seems likely that it is quite an important one, as a weak memory for the rise and fall of the notes in a melody would certainly lead to more mistakes in the learning of tunes than are normal, and therefore to the danger of the person concerned being classified as a non-singer, with all the psychological consequences which this brings in its train. It could also breed a lack of interest. The subject of weak memory is covered in my research by the fact that musical intelligence is less in the non-singers than in the singers, the test for Memory being one of the elements.

Priestley and Grayson suggest three remedies: restrained singing in the Infant Stage; the placing of these children beside musical children and the instructing of them to listen carefully and to sing quietly; and for persistent trouble, the teaching of singing in private. The methods of

teaching suggested are good. I am not in a position to comment on the advice about restrained singing, but feel that it is probably sound. I doubt the wisdom of moving them about or of doing anything that might make them feel obvious. I consider that to call attention to a natural processs as though it were a defect, is likely to breed the troubles due to the critical class and the self-critical child.

It seems impossible that the opinion expressed by Munn that a poor result in the Seashore Test of Auditory Differentiation could of itself decide that a person would be wasting his time by studying an instrument. Other factors, e.g. Musical Memory, would have to be taken into account, as indeed they were by Seashore himself. Munn probably performed the whole of the series of tests, but does not mention having done so, and bases his argument on the one quoted. I am assuming that, like all the members of my groups, he could differentiate less than a semitone.

The view is sometimes expressed that much time can be wasted on the treatment of these children; and the graphs show them to be less musically intelligent and less interested in the subject than normal people. It might also be maintained that they would probably be able to cure themselves as a rule. It is difficult to alter musical intelligence, but high ability in this department is surely not a pre-requisite for the enjoyment of singing, any more than high literary ability

is for the enjoyment of reading. In any case there is a minority of these children with considerable musical ability and intelligence, together with a large average group; and for them, musical culture is surely worth while. In January 1949 when increased numbers of defective voices came under my care, an assessment with regard to interest was made of all, including children, already having corrective lessons. The Wing questionnaire for Interest, given six months later, proved that there was a considerable general increase, particularly at the higher intelligence levels. At all events, the average non-singer was always very pleased when, as training progressed, he realized, that at last he could do something which before had seemed impossible. New avenues of interest were, in addition, opened out in many cases, these being of special benefit to the artistic type of child. Of the eighty-one whose cases were investigated, I have formed the opinion that ten might under favourable circumstances have cured themselves, though much more slowly than was in fact done; whereas seventy-one would quite certainly not have done so, but would have remained unable to sing for the rest of their lives. That many people in the past did not succeed in teaching themselves to sing, and have regretted in later life their inability to do so, has been borne upon me by the remarks of at least ten people of my own limited circle of acquaintances. These included a doctor, several

business men, school teachers, and clergy, all of whom stated they were 'tone-deaf' and had never been able to sing. In every instance they felt that one side of a cultured life was missing.

The investigations of the possible causes of singing disability, which were carried out, had one other valuable feature: they were the means of discovering the need for specialised treatment for certain complaints of the nose, ear, and throat. Fifty-three persons were completely cured, that is to say they were able to sing normally; not that their voices were necessarily of very good quality, though the incidence of those of good, of average, and of poor quality formed a fairly normal curve. A few joined church choirs and developed as singers until they became really good. Eight were not cured, one of them because the effects of successive throat operations made it rather painful for him to sing. They all showed some improvement as a result of their treatment, however, and it is my opinion in the light of later knowledge that the first seven could have been put right, and that the last mentioned could probably have had his throat strengthened by judicious vocal exercise. Five children, all of whom were progressing well, left school before the course of corrective lessons was completed. Fifteen are, at the time of writing, receiving lessons, two of them being boys whose treatment was discontinued

earlier. All but one are showing great improvement, and he has developed a little, but is a medical case and needs suitable treatment.

It should be emphasised that nearly all those who have come under my care in this way have been confirmed non-singers. As I have already pointed out I make a distinction between young children who are in process of learning to sing, and older children who for some reason have failed to do this in the normal way. Most of my work has been amongst boys and girls of the latter type. The former can be left to work out their own salvation as a rule, though a little individual attention will speed the process. The important thing is that they should be allowed to do this without the type of interference which may be the cause of mistaken ideas. There is nothing wrong with them; and, with a little determination, any teacher can condition his ear to disregard their faulty notes. At all events it is essential that this be done.

It will be seen that the treatment of many of the cases lasted for longer than one year; and the person who would correct these faults needs endless patience, and a determination to persevere for as long a time as is necessary to ensure success. Increasing knowledge of the subject has taught me that, if one waits long enough and does not stick always to stereotyped methods even though they may have been very successful, a means can always be found to surmount

obstacles to progress. The old proverb.which says that the steady drip of the water wears away the stone, is applicable here. The work will bring many temporary disappointments, but it will bring rewards which far outweigh them, in the gratitude of children who have learnt to sing like the others and are no longer 'different' and 'lacking', and in the opening up of the possibilities of musical culture to the artistic and intelligent ones, to whom it has hitherto been a closed book. It is to be hoped that more and more music teachers will take up this work in addition to their regular lessons; they will find that their time will not be wasted, that they will do more to build up general confidence in children who lack singing ability than is usually realized, and that they will themselves finally have the satisfaction of having done something which was very well worth all the effort needed. Ten years have taught me much about vocally defective children; but the further I go, the greater is my realization that there is still much to learn. It is my hope that this hitherto almost uncharted region will be fully explored, and that we shall hear no more of 'ghosts', 'growlers', and 'grunters', nor of 'tone deafness'.

APPENDIX 1

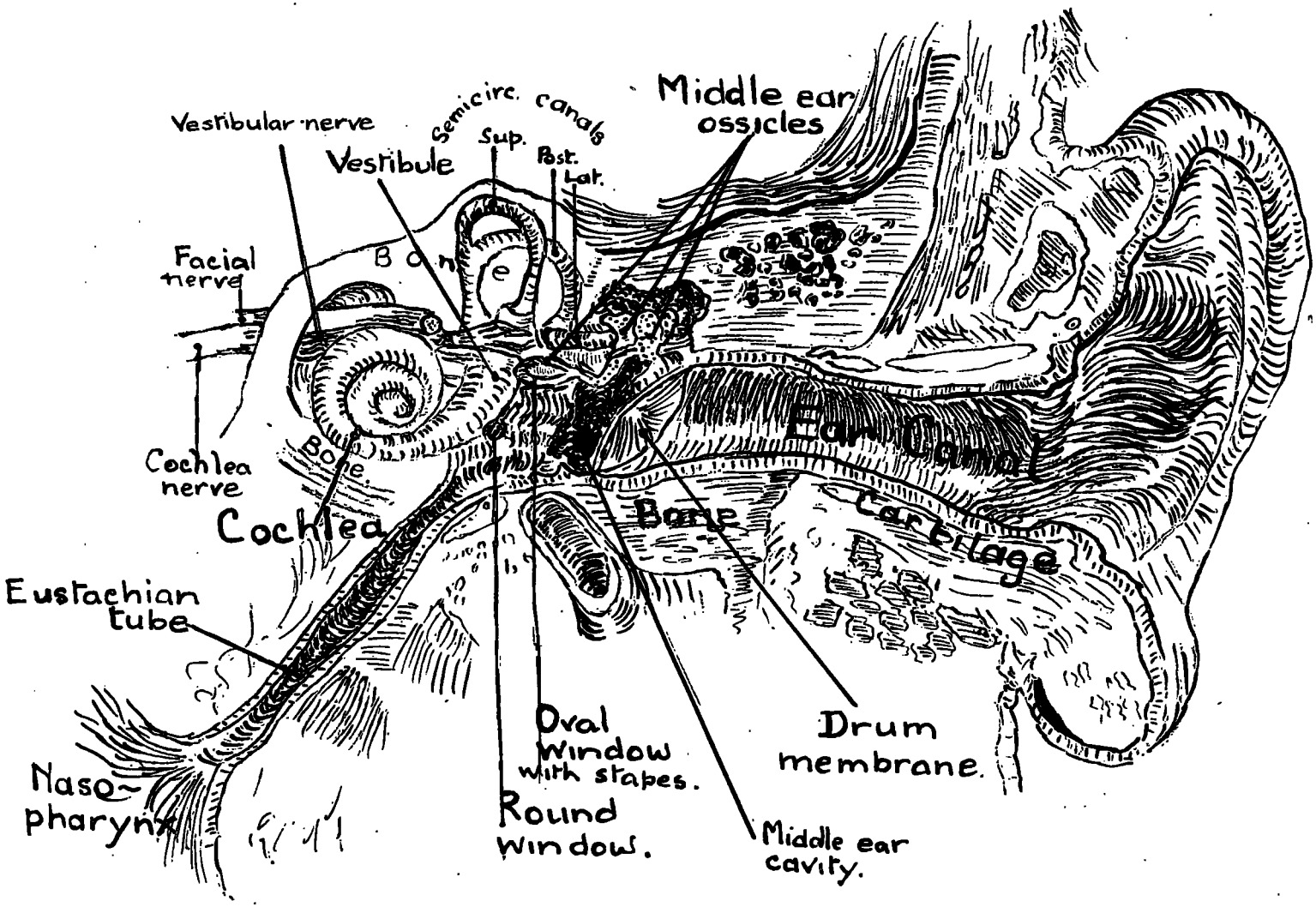
In the following paragraphs will be found an account of the construction and working of the eye, ear, and vocal organs together with illustrations of the various parts referred to in the thesis.

The Ear

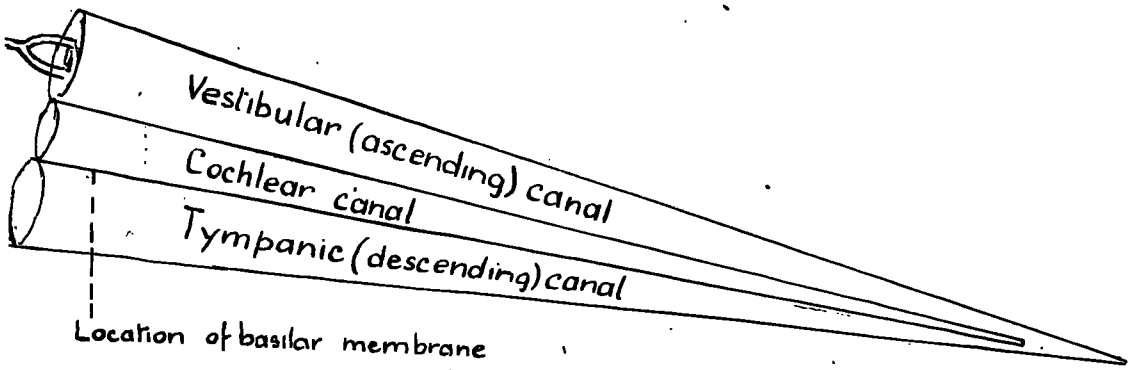
Sound waves are unlike light waves in that they will only travel through some conducting medium like air, water, bone, metal, wood, etc., whereas light waves will travel through a vacuum as well as through transparent or semi-transparent media like glass or thin paper. These sound waves are set up by a vibrating body and are, in general, transmitted through the air to the eardrum. Here they pass through the mechanism of the middle and inner ear and arouse mechanical activities which result in the stimulation of nerve fibres. When these impulses reach the brain, we are said to hear.

The ear is a most delicate and sensitive apparatus for detecting, analysing and transforming into a suitable medium for transmission to the brain, as many of those sound waves as can reasonably be dealt with. The external ear helps to collect the sound waves; and they pass through the auditory canal, which is named the outer ear, until they reach the 'drum', or 'tympanum', at its end, and cause it to vibrate. The tympanum has attached to it a small bone called from its shape the 'hammer' or 'malleus', and this in its turn activates

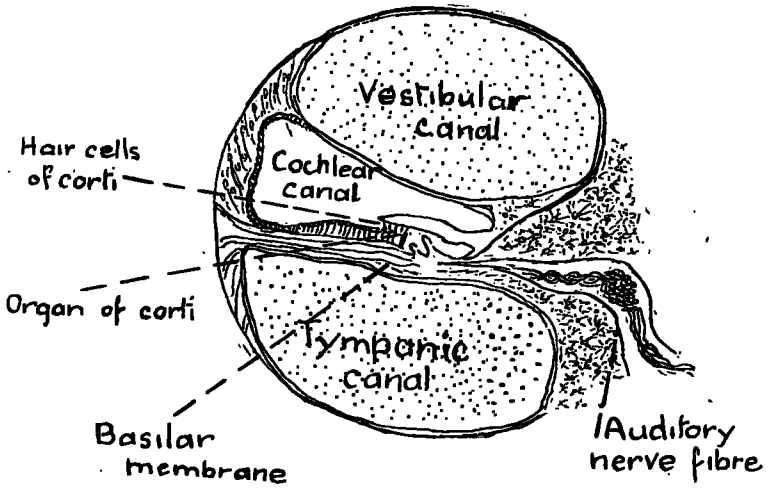
another small bone, the 'anvil' or 'incus' which finally moves yet another bone named the 'stirrup' or 'stapes' which presses against the 'oval window', the entry to the inner ear. Attached to the hammer is a muscle named the 'tensor tympani', and its function is to adjust the hammer and the drum for different intensities so as to prevent injury to the membrane of the drum. The part of the ear between the tympanum and the oval window is named the 'middle ear'; and the three small bones are collectively referred to as the 'ossicles'. When the sound waves have passed through the oval window they enter the 'cochlea', the shell-like portion of the inner ear, which is concerned with the reception of sounds.



(From 'Three Unpublished Drawings of the Anatomy of the Human Ear.' by Max Brödel)



A Diagrammatic Representation of the Uncoiled Cochlea



A Cross-Section of the Uncoiled Cochlea.

(From Munn. S L., 'Psychology'. Pages 368 & 369.)

The cochlea is a bony structure resembling the shell of a snail; and it measures about 5 mm from base to apex, and about 9 mm across the base. There is a central axis known as the 'modiolus', and a canal which winds round it for $2\frac{3}{4}$ turns. Projecting from the modiolus is a ledge of bone, the 'osseous spiral lamina'. Two membranes, known as the 'basilar membrane' and the 'membrane of Reissner', stretch from the lamina to the outer wall of the cochlea, completely dividing the canal into three passages, the two main ones of which are connected in one place only, at the 'helicotrema' situated at the apex. The ascending channel is called the 'vestibular canal'; and the descending the 'tympanic'. At the end of the tympanic canal is the 'round window'. The two membranes, together with the outer wall, also enclose a smaller channel known as the 'cochlea canal', in which are situated the sensory cells concerned with hearing. This canal ends at the helicotrema. On the inner edge of the basilar membrane is the 'organ of Corti', with its hair cells, which project up into the liquid which fills the cochlea canal, and which connect with the dendrites of nerve fibres that run along the centre of the cochlea and out into the auditory nerve. The basilar membrane itself has fibres ranging from short to long; the shortest being at the base of the cochlea, the longest at the apex. When a disturbance occurs in the cochlea, the basilar membrane is set in motion and a bulge occurs.

Each part of the membrane seems to be tuned to a different frequency from other parts so that the position of the maximum bulge is always in the place tuned to that particular frequency of the sound. This movement in the basilar membrane stimulates the organ of Corti; its hair cells bend at the position of the maximal bulge, and as a result the associated dendrites and their attached nerve fibres are activated. These impulses go to the thalamus and thence to the cortex.

'Tonal Lacunae' or areas of insensitiveness to sound, can occur, the surrounding sensitive regions being known as 'tonal islands'. It is usually possible to obliterate these lacunae by increasing the power of the stimulus.

The cochlea has the property of converting the sound waves which stimulate it into electrical currents, the effect being known as the 'cochlea microphonic'. These, like the sound waves that set them up, range from 20 to 20,000 cycles per second, and faithfully reproduce the effects of the sound waves.

The nerve impulses are probably generated in the hair cells of Corti. Single nerve fibres can carry only up to 1000 impulses per second, and the auditory nerve can carry up to 3000.

The auditory nerve fibres run from the cochlea in a spiral arrangement, the twisting corresponding to the coiling of the cochlea itself, and there is in the medulla, to which it runs, a pattern or projection of the organ of Corti. There is a similar map in the medial geniculate body and as the

fibres running from this part of the brain to the cortex are patterned in a like manner, there is a strong probability that the cortex itself has a projection of it, too.

Various theories of hearing have been put forward. The Resonance Theory of Helmholtz expressed the view that all fibres of the basilar membranes resonated to frequencies as do a piano's strings, each region of the membrane being tuned to a particular frequency. There is considerable evidence, largely based on experiments on animals, but partly based on observation of human ears, that, for low notes, the disturbance of the basilar membrane is near to the helicotrema, where the fibres are longest and the membrane itself broadest and where the mass of cochlea fluid to be moved is greater; and that, for high notes, it is near to the round window, where the reverse conditions hold. The cochlea behaves as it if contained a set of tuned resonators, though probably the principles underlying this are complex.

Thus it may well be that, while it can be agreed that particular frequencies activate particular parts of the basilar membrane, it is not possible to view the cochlea as a simple resonance system: the Place Theory and the Resonance Theory are not necessarily synonymous.

The evidence for the Place Theory is as follows. Substances like cocaine or sodium chloride were placed on the round window membrane of the cochlea, and there was a loss of

hearing for high frequencies. Gradual high-tone deafness in man, due to advancing years, is associated with partial atrophy of the auditory nerve supplying the lowest coil of the cochlea. Abrupt high-tone deafness demonstrates as a rule the same features, though here there are exceptions where nerve atrophy, or indeed any reason for the defect, cannot be detected. Examination of the ears was made after death; and the condition of the ear was known before. Measurements of the cochlea microphonics showed that the cochleas of the cat and the guinea pig were tuned at one end to high tones and at the other to low tones. Drilling into the cochleas of guinea pigs produced fairly definite location on the basilar membrane of the areas for notes. The position at present is that whilst it is not yet possible to say with any certainty how the ear distinguishes one pitch from another, it is certain that the pitch heard is related to the particular part of the basilar membrane which has been excited, and the Place Theory can account for differences of loudness, for overtones, for beats etc.

Of the other theories put forward the Frequency Theory of Rutherford assumes that the ear is like a telephone receiver; and that a stimulus of a given frequency causes the auditory nerve to convey a stimulus of a similar frequency to the brain. Pitch depends on the number of nerve impulses reaching the brain, to which is attributed the power of analysis

which produces harmonics, beats, etc. As a single nerve fibre will carry impulses only up to the rate of one thousand per second, and as the auditory nerve itself will carry impulses up to the rate of three thousand per second, the Volley Theory, that fibres work in squads and not all at once, was framed to meet part of the difficulty. This leaves the Place Theory to account for the frequencies above three thousand per second. ('Hearing', Stevens & Davis, [17]; 'Psychology', Munn, [10]; and 'Three Unpublished Drawings of the Anatomy of the Human Ear', Brodël, [1])

The Vocal Organs

The vocal organs are situated between the mouth and the chest, and consist of the mouth with its hard and soft palates, the tongue, the teeth, the lips, the nose, the pharynx, and naso-pharynx, the larynx with its various components, and the lungs. The lungs provide the air, the larynx has the double reed which causes the necessary vibration, and the pharynx, naso-pharynx, and mouth act as resonators. The larynx consists of a framework of cartilages, connected by membranes and ligaments, and lined with mucous membrane. The cavity of the larynx is divided into upper and lower divisions by the glottis, and is partly bounded by the vocal cords. These consist of two elastic bands of a fibrous tissue, bounding the aperture of the glottis in its anterior two-thirds.

When sounds are being produced, the vocal processes are in contact with one another, the slit-like orifice between them

being elliptical for lower notes, (the thick register), and in the form of a straight line for the higher notes (the thin register). When a man sings falsetto the slit widens; when a woman sings in an abnormally deep voice the bands become narrowed. Boys, women, and girls normally use the thin mechanism (for high notes); men, the thick (for low notes). Male altos and female tenors reverse this process.

Faulty phonation is due to several causes. It can be because of deformity of the vocal cords or of the apparatus of resonance; or else to adenoids, congestion etc., which would impede correct working of the organs. It can be caused by misuse of the vocal mechanism; for instance, by distortion of the resonator, or faulty breathing. The symptoms are: throaty, harsh, tone, faulty intonation at parts of the vocal compass, etc. The persistent flattening of the tongue, rigidity of the jaw, a depressed larynx, harsh breathing, and the 'whispering' of vowels can all be contributory causes of bad phonation; and they can be corrected by suitable exercises. ('The Mechanics of Singing', Evetts and Worthington,[6])

In view of the fact that many people consider that a parallel exists between tone deafness and colour blindness, the mechanism of colour vision ought to be studied. Vision of grey, white or black is spoken of as achromatic; colour vision, as chromatic. Light waves differ from sound waves in that they will pass through empty space, and most solids will not transmit them; whereas sound waves will not pass through

space, but only through a conducting medium like air, water, and almost all solid bodies. The part of the human and animal body which is sensitive to light is known as the 'retina', the most sensitive place being the 'fovea', which is opposite the lens. This extension of the brain, for that is what the retina is, has, as receptor elements, neurons of two types, 'cones' and 'rods'.

Cones are sensitive to colours, and animals whose eyes have none, are colour blind. They are thickest in the fovea, where no rods occur, and where sensitivity to colour is greatest, and where all colours are easily observed. The greater the distance from the fovea, the fewer are the cones, and the higher the number of rods; and the less sensitive to colour does the retina become, until in its outer areas it sees only greys, whites, and blacks ('Psychology', Munn, [10]).

These brief descriptions of the construction and workings of the ear, voice, and eye, provide sufficient material for an understanding of references in the succeeding chapters. It is impossible to be very definite about how the ear and the eye analyse the waves they receive, as direct observation of the process is extremely difficult; and as there are, in both instances, controversial views, which new research is continually modifying. With regard to the voice, quite recently, cine-photographs of the larynx in phonation have been obtained; and these disclose that the vocal cords do not form a simple vibrating mechanism, but that the vibration patterns are ex-

tremely complex. These matters, however, hardly come within the scope of this work; which is mainly concerned with the practical aspects of ear and voice, and but little with the theoretical. Its main concern is to discover the causes of and treatment for specific vocal defects.

APPENDIX 2

Since the thesis was completed, the only boy who has so far defeated most of my efforts, has begun to improve. He is referred to on page 84 of Chapter 5 (1D) and again on page 127 of Chapter 7. In the lesson where this occurred, he began, as usual, by singing in his thick register, up to B^1. He was then told to try to 'squeak' as high as he could. After one or two efforts he produced E^2, which was at once played, and was located to 'loo'. The note was not, in fact, squeaked at all, but was pleasantly sung. He tried to go higher, and this time sang G^2 which was located, like the first, to 'loo'. He was able to sing downwards with a certain amount of control, to about B^1, at which point there was a break between the registers. The highest note he sang in the lesson was A^2. He was using the thin mechanism of production for the first time in his life. The quality of the notes seemed to be affected by his 'catarrh', but I am very hopeful now that he will learn to sing quite normally in spite of this.

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