

JOHN KEATS'S DEBT TO SCIENCE

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PREFACE

In studying creative work, an investigator should be familiar not only with the productions of the artist in question, but with the forces that influenced the artist. He should state his critical estimate of a writer only after he has knowledge concerning the author's time, the actual experiences of the author, his reading, and his reactions to the stimuli about him. He should know something of the principal trends of thought which distinguish the period in which his subject lived; he should know whether the ideas current were philosophical or materialistic or scientific. For it is the nature of man that he cannot live in the world without reacting in some manner to the thoughts of the day, whether in a positive or a negative fashion. Perhaps the reaction may not be evident at first glance, but if the artist puts a great deal of himself into his work, though his work be universal in its appeal, there is in it a certain trace of his age.

Besides being interested in the problems of environment, the investigator also needs to be concerned with the experiences which the writer under consideration had; for the experiences of an artist, particularly of a writer, will weave themselves into his creation in some manner. In the realist, such evidence is readily apparent. In the romanticist, it is subtly brought forth from the store of things he knew at first hand. Even in the mystic, who dreams of things unseen, there will be proof of his experience. In truth, the artist is not entirely divorced from reality. Since man aspires to be as great as the ideas

which he has distilled from his time, from his life, and from his reflections, it is important for the investigator to search for the artist's reactions to experience. Perhaps he will find his artist organizing these reactions into a philosophy of life and art, or only approximating a balanced view of life.

With these general ideas in mind, the investigator writes the present study, the main thought of which is Keats's debt to science. She divides her research into four chapters. The first chapter discusses the biological ideas which were current in Keats's day and the evidence of Keats's reaction to these ideas. The second deals with Keats's actual scientific experience: his life as a surgeon's apprentice and his further training in a hospital. The third treats in detail Keats's poetic use of material from physiology and anatomy. The fourth deals with the evidence in Keats's poetry of scientific knowledge other than that included in the discussion of his medical information. The conclusion states wherein Keats's debt to science lay.

For patient and intelligent assistance in preparing the thesis, I express my gratitude to Dr. Autrey Nell Wiley, who directed this research. Her inspiration and encouragement were essential in the tasks of note-organization and composition. To Dr. L. M. Ellison, I owe innumerable suggestions taken from his lectures in English literature; to Miss Elida M. Pearson, I owe many suggestions taken from her lectures on bacteriology and medical practices and gained from conferences with her. Dr. Sarah Bedichek has been helpful in giving me ideas concerning

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When it has reached as low as the third dorsal Vertebra it bifurcates into the right & left Bronchiae of which the right is the largest but the left longer of the two: these go to the Lungs.

It is composed of numerous portions of Cartilage of the Horse shoe shape having at its posterior part muscular fibres placed.

The Structure of the Heart.

The Heart is composed of 4 Cavities surrounded by muscular fibres, two of which are Auricles and 2 ventricles.

The right Auricle has 4 Openings into it viz those from the superior and inferior Cavae, one into the Ventricle and the other into the coronary Vein.

The Right Ventricle has 2 Openings into it: one from the Auricle the other into the Pulmonary Artery.

The Left Auricle has 5 openings: - 4 from the Pulmonary Veins and one the ventricular opening.

The Left Ventricle has 2 Openings: - one from the Left Auricle, the other into the Aorta.

The Taberculum Loweii is situated between the openings of the Venae Cavae within the Right Auricle.

The Valvular Insulis Endothecae is placed at the commencement of the Vena Cava inferior.

The Mouth of the Coronary Vein is protected

By a large Valve of a Semilunar Shape called the Semilunar Valve of the Coronary Vein.

CHAPTER I

INTRODUCTION: KEATS'S HERITAGE IN BIOLOGICAL SCIENCE

In connection with a study of the period in which John Keats lived (1795-1821), the relation between science and modern life has significance, for at that time the foundations of modern science were being laid. If it is still being declared that we are gaining knowledge and acquiring control of stupendous forces faster than we are developing ability to control ourselves and to be entrusted with these new forces,¹ how much greater must have been the conflict between scientific reasoning and the emotions in the early part of the nineteenth century! During those years, doubt concerning established ideas was replaced by equally doubtful new conceptions. The pre-Darwinists were not sure that their theory of man's gradual development was true. In truth, only recently has this theory been proved to the satisfaction of most thinking people. Sir Arthur Keith, in an address given several years ago, "showed that fifty years of fossil study had given extraordinary confirmation to the general outline of the evolutionary conception, had placed it, indeed, upon well-nigh impregnable foundations."² Since biologists were just beginning to bring together the disturbing evidence that

¹From a sermon by the Bishop of Renan, quoted by Frank W. Cushwa and Robert N. Cunningham, Ways of Thinking and Writing (New York: Charles Scribner's Sons, 1936), p. 60.

²Robert Andrews Millikan in "Science and Modern Life," a part of Science and the New Civilization (New York: Charles Scribner's Sons, 1930), included in Ways of Thinking and Writing, edited by Frank W. Cushwa and Robert N. Cunningham (New York: Charles Scribner's Sons, 1936), p. 60.

man's history did not coincide with the traditional ideas on the subject, every thinking person of the time was asking questions. How had the development suggested by scientists come about? What was its significance in relation to a comprehensive view of life? What was the explanation of Nature's way of enabling the fittest to survive? Satisfactory answers, as scientific truths, were not to be had at that time. Besides the queries proposed by the biologists of the period, there were those produced by workers in the fields of chemistry and physics, the parent sciences of biology. If acceptable answers to the questions of life in general were reached by men similar to Keats, they were likely to be mingled with faith in man's progress based on little scientific proof and with realizations of the darker sides of life. The modern evolutionary philosophy which has given a new emotional, forward-looking basis to life, had not yet found acceptance in the early nineteenth century; so emotional unrest as well as intellectual doubt and questioning was characteristic of the period. Even those romanticists who possessed faith in something were not without some vestige of emotional and intellectual groping. Keats was not an exception.

In the history of biological thought, the nineteenth century will always be regarded as a tremendous epoch, not only for the general ideas which it produced but also for the specific research which came out of the period. Foundations for the extreme amount of interest in biological research at this time had been laid by the natural-philosophical school of the latter part of the eighteenth century. Philosophers before 1800 had been debating over mechanistic conceptions of life, and their controversies

gave birth to an enthusiastic study of natural life. The significance of the natural-philosophy of the latter part of the eighteenth century is well stated by Erik Nordenskiöld in his The History of Biology:

The service it has rendered to humanity lies in the lively interest for the study of nature which it evoked in the scientists of its era--an interest in striving to find law-bound phenomena in existence. Otherwise its age certainly specialized in speculation upon abstract ideas, as Hegel and his school would have it; but the fact that during this period the study of nature did not disappear altogether nor degenerate into a mere handicraft is at any rate due in no small measure to natural philosophy. Many of its ideas, indeed, recur, in a more or less revised form, in the biology of the nineteenth century.¹

Inasmuch as natural philosophy was developed by men who were more philosophic than scientific in their approach, its relation to biology diminished at the beginning of the nineteenth century, but the early relation of the two was still remembered. Perhaps this is the reason that Keats uses the term "old philosophy" in expressing a desire for more knowledge:

Pangs are in vain, until I grow high-rife
With old Philosophy.²

The transition from natural philosophy to modern biology did not occur as the result of the work of any one scientist. During the early part of the nineteenth century, biologists were paving the way for Charles Darwin's Origin of Species, published in 1859. The principal biological work during the last decade or so of the eighteenth century and the first decade of the nineteenth century was in the field of comparative anatomy, or in works which finally

¹Erik Nordenskiöld, The History of Biology: A Survey, trans. Leonard Bucknall Eyre (New York: Alfred A. Knopf, 1928), p. 298.

²John Keats, "Lines on Seeing a Lock of Milton's Hair," The Poetical Works of John Keats (ed. H. Buxton Forman; London: Oxford University Press, 1934), ll. 30-31, p. 301.

resulted in the science of comparative anatomy. In this work we find elements derived from the scientific research of the two preceding centuries which sought a mechanical explanation of nature. There are also elements derived from the natural philosophy which tried to answer by theory those questions which science had been compelled to leave unsolved. A few examples of the exact natural research, representative of the transition to modern biology, will make clearer the status of biological thought at the beginning of the nineteenth century.

I. The Work of Vicq d'Azyr and Keats's Conception of Nature

Felix Vicq d'Azyr, born in 1748 at Valogne, France, was a physician whose practical career included work on epidemics, veterinary surgery, and organizational problems of medicine. His theoretical research in anatomy and physiology, however, is the work in which he contributed most to the development of biology. He said that the study of anatomy should be taken up from the point of view of comparative anatomy, as created by Daubenton, and should proceed to physiological theories. He found the essential difference between animate beings and inanimate things to be that plants and animals possess common characteristics which stones and minerals lack. The old comparison between the growth of the crystal and of the organism he rejected. He classified the functions of the organism thus: (1) digestion, (2) nutrition, (3) circulation, (4) respiration, (5) secretion, (6) ossification, (7) generation, (8) irritability, (9) sensibility. These various functions, and the organs relating to them, he examined in different life forms. The system which he introduced indicates a keener

eye for the life functions than that possessed by any of his predecessors. Besides contributing to specific biological thought, Vicq d'Azyr criticized the current theory concerning the essence of life, stating that there is nothing to be gained by referring to the soul as the cause of a number of phenomena existing only in living organisms, that these phenomena should be studied through observation and experiment. This remarkable Frenchman, D'Azyr, also criticized the theory that the different parts of the embryo come from the similar parts in the parents, a theory held by such a man as Darwin. Thus, D'Azyr foreshadowed views expressed by modern students of genetics. Another contribution which he made was his realization of the necessity for clear ideas and unambiguous words in natural science. Of his work in comparative anatomy, his most remarkable contribution is his comparison of the same organs in different animals. He also broadened the comparison between man and apes; he investigated the teeth of the entire vertebrate class; and he pointed out the dissimilarity in the number and the morphology of teeth in mammals having different habits. For example, he found that a certain shape of tooth presupposes a certain type of structure in the extremities and the digestive canal, because the animal's parts are adapted to his mode of life. He also went into detail about how these characteristics give every animal a special rôle in nature's struggle among the various types of life forms.

The struggle in nature among the different forms of life was commanding much attention among the pre-Darwinists. That Keats was sensitive to thoughts in this particular direction and impressed especially by evidence of destruction is illustrated by

the following passage, which describes nature's cruelty:

But I saw too distinct into the core
Of an eternal fierce destruction,
And so from happiness I far was gone.
Still am I sick of it, and tho', to-day,
I've gather'd young spring-leaves, and flowers gay
Of periwinkle and wild strawberry,
Still do I that most fierce destruction see,--
The Shark at savage prey,--the Hawk at pounce,--
The gentle Robin, like a Pard or Ounce,
Ravening a worm--Away ye horrid moods,
Moods of one's mind! You know I hate them well.¹

The same note is apparent when Keats writes words which seem prophetic of the idea which was later described by the phrase "survival of the fittest":

Too far into the sea, where every maw
The greater on the less feeds evermore.²

II. The Work of Johann Blumenbach and Keats's Mention of Anthro- pology and the Formative Force

Another great man who helped shape the biological ideas of his time was Johann Friedrich Blumenbach, born at Gotha in 1752. He was a comparative anatomist and a pioneer in the branch of anthropology. He collected as many skulls and skeletons of as many different races of man as he could, and from this collection he made a comparison of the characteristics of the different races of man. His postulate that the races (Caucasian, Mongolian, Ethiopian, American, and Malayan) are varieties of one species is still believed.

There is a passage in Keats which suggests at least a knowledge of the existence of anthropology. In the lines following,

¹"Epistle to John Hamilton Reynolds," ll. 96-106.

²"Epistle to John Hamilton Reynolds," ll. 94-95.

which describe the finding of a group of fossils, he says:

Of ancient Nox;--then skeletons of man
Of beast, behemoth, and leviathan,
And elephant, and eagle, and huge jaw
Of nameless monster. A cold leaden awe.¹

Besides studying the races, Blumenbach studied the characteristics wherein man differs from the other mammals. His views on the primal creating force are also significant. Biologists at this time, were greatly interested in the source of life. Blumenbach believed that development is caused by a special "formative force"² which is displayed in the embryo, all kinds of growth, regeneration, and reproduction.

A passage in the poetry of Keats describes light as the creative force. Of course, Keats may simply have been applying an imaginative touch to a story of creation, but the presence of the passage indicates that he, too, had given the matter of creative force some thought. The following story of creation has as its inspiring or life-giving agent, light:

'From chaos and parental darkness came
'Light, the first fruits of the intestine broil,
'That sullen ferment, which for wondrous ends
'Was ripening in itself. The ripe hour came,
'And with it light, and light, engendering
'Upon its own producer, forthwith touch'd
'The whole enormous matter into life.'³

III. The Work of Scientists Especially Interested in the Brain and in Psychiatry

Thomas Sömmerring (1755-1830) was a contemporary and an equal of Blumenbach. His general conception of nature was

¹"Endymion," Book III, ll. 133-136.

²Nordenskiöld, op. cit., p. 307.

³"Hyperion," Book II, ll. 191-197.

somewhat influenced by mystical natural philosophy, though he was a careful investigator, especially in anatomy. An interesting study which he made was a comparative study of the visual and auditory organs in different races of mankind. It is also interesting that, for a time, he carried on alchemy, later realizing his delusion. His unusual work concerning the brain, Über das Organ der Seele, is a combination of anatomy and philosophy. For the first time in scientific history, he treated the sympathetic nervous system as independent of the central nervous system, which is in indirect connection with the brain. In the entire study, in which he considered the brain as the organ of the soul, the author tried to prove that the cerebral nerves open into the central cavity of the brain and that the cerebral fluid is the organ of consciousness. Nevertheless, he was one of the leading anatomists of his day. That Keats was also interested in the brain and in nerves is made evident by references in his poetry. These references are discussed in Chapter III in the section dealing with internal anatomy, but they are mentioned here in order that the poet's interest may be understood in relation to the general scientific interest of the age.

Another scientist, Franz Joseph Gall (1758-1828) approached more nearly the modern ideas of the brain and nervous system. The most brilliant brain-anatomist of his age, he begins with simple nerve-fibre in his discussions of the nervous system. The ganglia are clearly described in his works. But the work that is of value to the future is his emphasis upon the nerve-tracts, his placing of the soul-functions in the cortex, and his assumption of hereditary intellectual tendencies.

This last work did much to displace the old idea "that all men possess like tendencies to virtue and genius."¹

Johann Christian Reil (1759-1813) was a physician and teacher, whose influence on biological thought was many sided. Of especial interest was his work in psychiatry, which, he insisted, should be elevated to an independent branch of study. In the age of pioneers in which he lived, he recorded a number of fruitful ideas along with a mass of nonsense. He stated the modern conception that animal phenomena cannot emanate from an immaterial soul and that such phenomena are due to the different composition in muscles, nerves, and bones. Here, he learned from the animal chemistry which began with Lavoisier. Though animal chemistry is not discussed in Keats, he does indicate a certain amount of interest in Reil's other field, psychiatry. This interest is only mentioned here, but it is discussed in Chapter II in connection with medical psychiatry.

IV. The Work of Humboldt in the Field of Botany

Shortly before 1799, Alexander von Humboldt (1769-1859) published his investigations concerning the influence of electricity upon muscles and nerves. His principal service to science, however, was his work on the effect which different environments had upon plants. His research was called vegetable geography; and his representation of plants according to common conditions of life instead of according to species nomenclature was a new idea.

Whether Keats's interest in botany was due to the work

¹Nordenskiöld, op. cit., p. 312.

of such men as Humboldt, whether it came as the result of general contemporary interest in living plant life, or whether it was aroused by his academic life at Clarke's school and by his medical training, it is difficult to say. Amy Lowell tells us that at Clarke's school, where Keats went as a boy, he had an opportunity to get "the rudiments of science--astronomy, geology, botany probably, possibly a little physics."¹ She also tells us that during the time Keats was attending this school, he "learnt the country and its fauna and flora, practically by heart."² Besides being stimulated by the curriculum of a boys' school, and moved by a natural interest, Keats may have been especially interested in botany from a medical point of view, for herbs occupied a significant place in contemporary therapeutic medicine. Yet the fact that the poet uses no species nomenclature, but at the same time discusses an imposing variety of flowers and herbs,³ trees and grass,⁴ shrubs

¹Amy Lowell, John Keats (Boston: Houghton Mifflin Co., 1925), Vol. I, p. 34.

²Ibid., p. 37.

³The frequency of reference to flowers and herbs is indicated within parentheses: balm (1), basil (1), blossoms (6), blow-ball (1), blue-bell (3), cassia (1), columbine (1), cowslip (4), daffodils (3), daisies (12), dandelions (1), cresses (1), fennel (1), flow'ret (1), flowers (23), forget-me-not (1), foxglove (2), gilliflower (1), hare-bells (1), heather-bells (1), hemlock (1), holly (1), hyacinth (3), jasmine (2), laburnum (1), lilies (18), marigolds (3), musk rose (7), night-shade (1), parsley (1), peonies (1), passion flower (1), periwinkle (1), pinks (1), poppies (9), primroses (7), roses (39), violets (12), water-mint (1), wood-bine (2).

⁴The frequency of reference to grass and trees is indicated within parentheses: ash (1), bay (3), beech (1), birch (1), chestnut (2), cotton (1), cedars (1), elm (3), fir-tree (3), fig tree (1), grass (25), hazel (1), larch (1), laurel (4), lime-tree (1), mistletoe (1), myrtles (7), oak (10), olive (2), palm (5), pollard (1), poplar (2), pines (9), reeds (5), rushes (2), sycamore (2), trees (17), willow (3), yew (3).

vines, grains, etc.,¹ fruits, berries, and vegetables,² and miscellaneous subjects referring to plant life³ indicates that, like Humboldt, he possessed an interest in the larger aspects of plant life. Such aspects as plant breeding evidently impressed the poet, for he speaks thus figuratively of plant genetics:

With all the gardener Fancy e'er could feign,
Who breeding flowers, will never breed the same.⁴

V. The Work of Lamarck Concerning Evolution and Nature's Laws with Evidence of Keats's Interest in These Topics

An interesting thing concerning Jean Baptiste Pierre Antoine de Monet (1744-1829), usually called Chevalier de Lamarck, is the fact that he created the word, "biology." But it was not until he reached the age of fifty, that he began his important work in zoology. His publication of his speculations upon evolutionary history was regarded as fantastic. When the modern theory of the origin of species was advanced, Lamarck began to

¹The frequency of reference to shrubs, vines, grains, etc. is stated within parentheses: barley (2), brambles (1), bushes (1), dock (1), ferns (2), fruit (4), furze (1), grain (4), hawthorn (2), hedge (1), hay (1), mosses (23), oats (2), sedge (2), thistle (1), vines (2), weeds (7).

²The frequency of reference to fruits, berries, and vegetables is given in parentheses: apple (2), berry (2), blackberry (1), bean blossoms (1), beans (1), cabbage (2), cauliflower (1), cherry (1), currants (1), corn (8), grapes (4), mushroom (1), oranges (1), pear (1), peas (1), plum (3), pomegranate (1), strawberry (2), whortleberry (1).

³The frequency of reference to miscellaneous subjects concerning plant life is indicated within parentheses: bark (1), boughs (1), buds (6), forest (6), leaves (9), roots (5), seeds (2), stems (2), thicket (1), woodland (1), wood (4).

⁴"Ode to Psyche," ll. 62-63.

receive greater recognition for his work. In addition to his ideas concerning evolution, he held that life is motion, a mechanical phenomenon. This materialistic conception of nature was already slightly out of date when he came upon the scene. He was, however, well known in the scientific world of his time.

Lamarck's theory of evolution may not have made a great impression upon Keats, and the comparisons between man and apes made by the comparative anatomists of the day may not have been accepted by the poet. However that may be, the fact that he mentions a variety of animals, including invertebrates,¹ elasmobranchs and amphibia,² teleostomi,³ reptiles,⁴ birds,⁵ and mammals,⁶ indicates a lively interest in the animal world. Besides,

¹The frequency of reference to invertebrates is stated within parentheses: bees (21), butterflies (6), crickets (2), flies (3), gadflies (5), glowworms (2), gnats (3), grasshoppers (3), leeches (2), may-flies (2), moths (5), scorpions (2), snails (2), spiders (3), wasps (2), water flies (1), worms (4), oysters (1).

²The frequency of reference to elasmobranchs and amphibia is stated within parentheses: sharks (2), toads (1).

³The frequency of reference to teleostomi is stated within parentheses: fish (14), goldfish (1), minnows (3), salmon (1).

⁴The frequency of reference to reptiles is given within parentheses: adders (1), alligators (2), crocodiles (3), lizards (1), serpent (14), snakes (5), turtles (1), vermin (1).

⁵The frequency of reference to birds is stated within parentheses: caws (1), chicks (2), crows (2), daws (1), doves (32), eagles (21), falcons (2), finches (1), gloom-birds (1), goldfinches (1), hawks (1), jays (2), kingfishes (1), linnets (3), larks (8), macaws (1), nightingales (13), owls (6), peacocks (2), pheasants (1), parrots (2), phoenix (2), robins (5), sea-fowls (3), swans (1), swallows (4), tittlebats (1), thrushes (3), woodlarks (1).

⁶The frequency of reference to mammals is indicated within parentheses: apes (11), bats (3), bears (1), beasts (3), beavers (1), boars (3), camels (1), cats (5), calves (1), deer (5), dogs (6), dolphins (3), elephants (3), foxes (3), heifers (3),

it is evident, from the following passage, that he was at least aware of the comparison between man and the apes:

A man may be 'twixt ape and Plato;
'Tis the man who with a bird,
Wren, or Eagle, finds his way to
All its instincts; he hath heard
The Lion's roaring, and can tell
What his horny throat expreseth,
And to him the Tiger's yell
Comes articulate and presseseth
On his ear like mother-tongue.¹

Lamarck said that the term "nature" should embrace:

(1) the physical bodies that exist, (2) the general and particular laws which direct the changes in the condition and position of these bodies, and (3) the motion current in all forms, eternally maintained and renewed. Keats speaks of "Nature" as a particular person. In this usage, he does not conform to Lamarck's definition of the term. Yet his belief that Nature's laws control our lives, that we are conditioned by such laws, coincides with Lamarck's ideas on the subject. In the following passage, Keats indicates his interest in Nature's definite, biological laws:

'We fall by course of Nature's law, not force,
'Of thunder, or of Jove. Great Saturn, thou.'²

The student of science discovers a kinship between biological laws, which received much attention from Lamarck, and the aesthetic ideas of Keats. Professor John Thorpe, quoting Mr.

hares (3), horses (20), hounds (2), kids (1), lambs (9), leopards (2), lions (11), lynx (1), monkeys (2), moles (1), mice (1), mules (5), oxen (2), panthers (1), pigs (2), rams (1), rats (3), seals (1), sheep (8), stags (4), steeds (9), squirrels (3), swine (1), tigers (6), whales (4), wolves (2), zebras (2).

¹"The Poet," ll. 7-15.

²"Hyperion," Book II, ll. 181-182.

Arthur Lynch, comments upon this aspect of the poet's aesthetics:

'Truth and beauty were not to Keats the adornments of a high work; they belonged to its inmost spirit. Beauty arises of the full development in conformity with Nature of a living thing; but in the great All of things the forces that are immortal, that are potent, are not those of immediate violence but those of delicate and tender touch; these respond to our aspirations in the most sensitive moods of vision and thought.'¹

In another passage, Keats links the idea of beauty with that of strength. While biologists of the day were concluding that might and right are almost synonymous in the animal world, Keats adds that a beautiful thing is strong:

'In right thereof; for 'tis the eternal law
'That first in beauty should be first in might.'²

¹John Thorpe, The Mind of John Keats (New York: Oxford University Press, 1926), p. 15.

²"Hyperion," Book II, ll. 228-229.

CHAPTER II

THE MEDICAL EXPERIENCE OF KEATS

Believing that artists, in their creative work, draw from their actual experience, the investigator has searched for information concerning this experience. In the investigation, it was found that, for several years, Keats served for an apprenticeship to a surgeon, Mr. Hammond. With his quick perceptions and excellent memory, it is impossible that he could have undergone this rather long period of training without some indelible impression having been made upon his thought both by the knowledge that he gained and by the experiences he had during this time. Few of his biographers have much specific information to offer about this period of his life; but Amy Lowell has more to say than any one else on the subject. Concerning his apprenticeship, she says:

A surgeon's apprentice in those days was a sort of handy general house and stable boy. He made up medicines, tended the shop, ran errands, went with his master on his rounds and held the horse, did, in fact, whatever there was to do in connection with the odds and ends of practice, and, as he became more proficient, acted as his master's assistant by doing all those things which we are accustomed to see done by an office nurse. His education depended entirely on the kind of man he was apprenticed to. If his master lived up to his part of the bargain, he might learn a great deal; if his master were lazy or incompetent, the time of his apprenticeship was wasted. But, whatever the master, the circumstances were such that a bright boy could pick up more than he was actually taught. Keats was a very bright boy. Leaving his genius entirely out of the question, his was a mind of very exceptional capacity. The fact is that, willy nilly, he became a good doctor. In the case of his own fatal illness, it is always his diagnoses which are right and those of his attending physicians which are wrong. Whatever was interesting, interested him, even if other things interested him more. He simply could not help learning; he had that sort of mind.

Clarke says that he liked his new job, for 'with the exception of the duty he had to perform in the surgery--by no means an onerous one--his whole leisure hours were employed in indulging his passion for reading and translating.' Clarke makes no mention of book tasks, but there must have been some. He must

have studied anatomy and physiology, and got a considerable amount of his materia medica by heart. But evidently these things came to him easily and quickly. His habit of concentrated study helped him there.¹

In 1814, Keats broke his apprenticeship with Mr. Hammond and became a medical student at St. Thomas's and Guy's Hospital. In a preface to The Keats Letters, Papers, and Other Relics, H. Buxton Forman says that after passing his examination with some credit, Keats became a surgeon's pupil in October, 1815, was entered as a surgeon's dresser at Guy's in March, 1816, and was licensed to practice in the same year.² Mr. Forman further states that Sir William Wilks, writing the history of Guy's hospital, says that Keats 'gained considerable skill in the exercise of his profession.'³ Mr. Forman adds that an extract from a letter by Sir William Wilks, appearing in the Guy's Hospital Gazette, 1895, IX, p. 436, gives this statement:

In the minute book of the Court of Examiners of the Society of Apothecaries, under the date July 25th, 1816, occur the following passages:

'John Keats attended and produced testimonials to the satisfaction of the Court, and was admitted to the examination. Mr. Keats was examined by Mr. Brande, and the Court granted him the Certificate for which he had applied'; that is, to practice as an apothecary.⁴

Besides the records giving the bare facts of his medical training, there are evidences in the poet's letters of his attitude toward his training. In a letter to his friend, Haydon, we find this statement,

Were I to study Physic or rather medicine again, I feel

¹Lowell, op. cit., p. 48.

²John Keats, The Keats Letters, Papers, and Other Relics, ed. H. Buxton Forman (London: John Lane Co., 1914), p. 35.

³Ibid.

⁴Ibid., p. 36.

it would not make the least difference in my poetry.....Every department of Knowledge we see excellent and calculated toward a great whole. I am so convinced of this that I am glad at not having given away my Medical Books, which I shall again look over to keep alive the little I know thitherwards.¹

Such an opinion at first glance seems rather unusual in a poet who, at the beginning of his career, had thought that imagination, sensation, and intuition should be the guiding forces in poetry. But his later poems indicate a large drain on his medical experience. Keats is now seeking both knowledge and experience for the sake of poetic power. John Thorpe tells us that Keats realized the deficiencies of his early poems and became dissatisfied with work which had no firm basis in the world of thought and reality. He wanted to write poetry based on something more certain than mere feeling or intuition. Mr. Thorpe, to prove his point, quotes a letter to John Haydon:

I am convinced of this, and from this I have come to this resolution--never to write for the sake of writing or making a poem, but from running over with any little knowledge or experience which many years of reflection may perhaps give me; otherwise I am dumb.²

Keats' desire for knowledge of the world and for experience, in order to write greater poetry, indicates that he realized the fact that great poets always draw from the store of their experiences and from their knowledge. The following chapter will attempt to show wherein his own experience as a medical man is reflected in his poetry.

¹Thorpe, op. cit., p. 68.

²Ibid.

I. References to Pain and Suffering

Keats's consciousness of pain and suffering is readily evident in his poetry. Such a consciousness would be natural in a physician, or surgeon, who daily witnessed such a large amount of suffering as he did. Using the terms "pain," "pains," "painful," "painfully," "paining," "pain'd," "pained," "painest," the poet makes approximately eighty-three references to pain. Though many of these lines refer to mental pain, at least one-third of them concern physical suffering. For instance, Keats discusses the pain accompanying a condition of hunger:

"And seldom felt she any hunger-pain,"¹

the bodily distress produced by a heart pain:

Then sudden it grew hot, and all the pains
Of an unnatural heat shot to his heart,²

the conduction of pain along a nerve:

"Thy girdle some fine zealous-pained nerve,"³

the pained feeling which sometimes accompanies a condition of dizziness:

Walk'd dizzily away. Pained and hot
His eyes went after them,⁴

the tenacity with which pain seems to cling and the slow movement of time to one in pain:

¹"Isabella," LIX, l. 5.

²"Lamia," Part II, ll. 252-253.

³Otho the Great, II, lli, 95.

⁴"Endymion," Book IV, ll. 904-905.

Pleasure is oft a visitant; but pain
Clings cruelly to us, like the gnawing sloth
On the deer's tender haunches,¹

the actions of a person suffering physical pain:

"She writh'd about, convuls'd with scarlet pain,"²

the tendency to faint and the pallor of one who is in pain:

"Swoon'd, murmuring of love, and pale with pain,"³

the occasional relief from pain of one who suffers a great deal:

"At times, 'tis true, I've felt relief from pain,"⁴

the accelerated pulse rate usually accompanying physical pain:

"Your pulse is shocking, but I'll ease your pain."⁵

The fact that Keats mentioned death 283 times in his poetry indicates that the subject impressed him greatly. Such frequency of mention, however, is made from many points of view other than from that of the relation of pain to death. The references to death in connection with pain are significant, however, in that they illustrate a natural reaction in one who has worked around hospitals for a long time. In the following reference, for example, he expresses a desire for a painless death:

"To cease upon the midnight with no pain."⁶

¹"Endymion," Book I, ll. 906-908.

²"Lamia," l. 154.

³"Lamia," l. 289.

⁴"To My Brother George," l. 113.

⁵"The Cap and Bells," XLVIII, l. 3.

⁶"Ode to a Nightingale," VI, l. 6.

The same connection between death and pain is suggested in:

Wilt thou forsake him at his latest hour?
Keep fearful and aloof from his last gaze,
His most uneasy moments, when cold death
Stands with the door ajar to let him in?¹

Besides the direct references there are numerous others to physical suffering. The terms "ache," "ach'd," and "aching" are used twenty-four times. Twenty-two miscellaneous references concern suffering. Among all these synonyms for "pain," there are some figurative usages. In describing the sufferings of Hyperion, Keats likens his misery to the physical pain produced by an aching giant nerve:

"But horrors, portioned to a giant nerve,
"Make great Hyperion ache."²

Other references to pain, direct in tone, mention aching eyelids,³ an aching forehead,⁴ and the aching condition of palsy.⁵ The references to agony, torture, and anguish indicate the impression made upon the young poet by suffering. In various references, for instance, the poet suggests the beads of perspiration and fever accompanying anguish:

"With anguish moist and fever dew,"⁶

the feverish breath and halting speech of one in pain:

Dismay'd; and, like a wretch from whom the rack
Tortures hot breath, and speech of agony,⁷

¹Otho the Great, V, ii, 12-15.

²"The Fall of Hyperion," Canto II, ll. 22-23.

³"Isabella," XLI, l. 7.

⁴"Lamia," Book II, l. 225.

⁵"The Fall of Hyperion," Canto I, l. 426.

⁶"La Belle Dame Sans Merci," III, L. 2.

⁷"Endymion," Book III, l. 257.

the vocal expression of pain¹:

"Shrieks, yells, and groans of torture-pilgrimage,"²
the piteous, helpless expression of the eyes found in one who
suffers intensely:

"Her eyes in torture fix'd, and anguish drear,"³
and a general sensitiveness to the pain and suffering in the
world:

In unimagined tortures--or breathe through
A long life in the foulest sink of the world.⁴

Before the day of psychologists, we find the observing
mind of Keats noting the relation of mental attitudes to pain.
In the line below, for example, he states that pain can be ac-
centuated by the mind:

"Imagination gave a dizzier pain."⁵

The poet also feels that pain can be relieved by focusing the
attention of the mind on something else. This feeling, in modern
times, is employed by physicians and psychiatrists. In the line
below, there is suggested a surcease from pain by concentration
on something interesting to the person concerned:

"Of charming my mind from the trammels of pain."⁶

¹There are approximately fifty-three references to
moans and groans in Keats's poetry.

²"Endymion," Book III, l. 524.

³"Lamia," l. 150.

⁴Otho the Great, V, i, 12-13.

⁵"Endymion," Book III, l. 1009.

⁶"On Receiving A Curious Shell....," l. 24.

The idea that an escape from pain can be effected through consuming intellectual interest is further discussed in the famous "Ode to a Nightingale":

Away! away! for I will fly to thee,
Not charioted by Bacchus and his pards,
But on the viewless wings of Poesy,
Though the dull brain perplexes and retards.¹

II. References to Health and Healing

The references to health found in the poetry of Keats are further evidences of his physician's training. Since the professions of medicine and surgery have as their activating purpose the promotion of health, if a poet drew at all from his medical experience, he would refer, in some way, to the condition of health. Such references are not missing in Keats's poems. There are twenty-one direct references to health and healthful conditions in his poetry, some of which are particularly significant in that they are written from the physician's point of view. For instance, any family physician may have uttered the lines following in prescribing for his patient:

Save when for healthful exercise and air,
She chose to promener à l'aile, or take.²

The next reference sounds almost like a modern public health official:

The gas (objected to on score of health),
Convey'd in little solder'd pipes by stealth.³

¹"Ode to a Nightingale," IV, ll. 1-4.

²"The Cap and Bells," V, ll. 6-7.

³"The Cap and Bells," XXIV, ll. 4-5.

The lines quoted below suggest both the healthful properties of midnight sleep and the unpleasantness of insomnia:

As when of healthful midnight sleep bereft,
Thinking on rugged hours and fruitless toil,
We put our eyes into a pillow cleft,
And see the spangly gloom froth up and boil.¹

The pleasant radiance of health is suggested by the following line:

"The natural hue of health, from vermeil lips?"²

The balanced functioning of a healthful condition is suggested by:

"Full of sweet dreams, and health, and quiet breathing."³

It is interesting to note that Keats thought physical health is conducive to cheerfulness of mind:

"That men of health were of unusual cheer."⁴

Another interesting note in Keats's work is the fact that he considered insanity from the point of view of mental health, an essentially modern view. Although insanity is discussed more fully in the next section, the investigator cites the following line as suggestive of the relation between health and madness:

"Aye, if a madman could have leave to pass a healthful day."⁵

Healing of wounds is mentioned in two passages,⁶ indicating again that his experience as a physician impressed him. The

¹"Isabella," XLI, ll. 3-6.

²"Endymion," Book IV, l. 148.

³"Endymion," Book I, l. 5.

⁴"I Stood Tip-Toe.....," l. 216.

⁵"Lines Written in the Highlands.....," l. 25.

⁶Otho the Great, II, iii, 149.

"Endymion," Book II, l. 483.

terms "dose,"¹ "remedy,"² and "alarming cases,"³ which appear in Keats's poems, are further indications of his medical experience. There are numerous references, also, using the term "medicine." The line below, for instance, states that the time of administering is an important factor in the curative capacity of medicine:

'Tis not the Medicine
Either of heaven or earth can cure unless
Fit time be chosen to administer.⁴

The other references to medicine are similar to the following in that they apply a figurative meaning to the therapeutic qualities of medicine:

"Medicined death to a lengthened drowsiness."⁵

In the following passage the terms "doctor" and "cure" are employed in a piece of psychiatric advice which urges against worrying the already harassed mind of a patient:

This learned doctor will agree with me,
That not in the smallest point should he be thwarted
Or gainsaid by one word--his very motions,
Nods, becks and hints, should be obey'd with care,
Even on the moment: so his troubled mind
May cure itself.⁶

The following similar reference, from the same play, implies the danger of heart failure to one who has already received a

¹"Epistle to John Hamilton Reynolds," ll. 112-113.

²Otho the Great, V, v, 20.

³"The Cap and Bells," LX, ll. 7-9.

⁴Otho the Great, V, iv, 2-6.

⁵"Endymion," Book II, l. 484.

⁶Otho the Great, V, iv, 29-34.

tremendous shock:

He is so full of grief and passionate wrath,
Too heavy a sigh would kill him--or do worse....
His heart is full, it can contain no more,
And do its ruddy office.¹

Approximately nine references to physicians are made in Keats's poetry. Several of these are peculiarly interesting. One suggests the practice of bloodletting, which was one of the chief therapeutic measures of the early nineteenth century physicians. The etiology of diseases produced by microorganisms was unknown since the germ theory of disease had not yet been established. For ages, physicians had thought that venesection and leechery (the use of leeches which sucked blood) were purging measures in relieving the body of malignant disorders. Though the practice is continued in modern medicine in rare cases, in Keats's time the very name of physician called up the image of the leech. For this reason, the following mention of the ancient bloodletting practice is an important indication that Keats drew from his experience in writing his poems:

"Physician Nature! let my spirit blood!"²

In addition to speaking of the process of bloodletting, the poet refers to the leech in two references, one of which, suggesting the satiety of the blood-sucking organism, is cited below:

"The stair-head; that being glutted as a leech."³

Another reference, using the term, "physician," is very significant because, in the lines following, he gives his estimate of

¹Otho the Great, V, iv, 19-20, 24-25.

²"Ode to Fanny," I, l. 1.

³"The Cap and Bells," LXXX, l. 5.

the aim of poetry, relating its mission to that of the physician:

'Are useless: sure a poet is a sage;
'A humanist, physician to all men.'¹

III. Specific References to Pathological Conditions

The pathological conditions most familiar to the early nineteenth century surgeon are well represented in the poetry of Keats. There is mention of sickness in general, weakness, fatigue, fainting, fever, pallor, palsy, chills, convulsions, gout, apoplexy, blindness, hoarseness, coughing, pimples, asthma, deformities, chapped conditions, brain-flies, and several localized conditions. Among the twenty references to fever, there are many which are very descriptive, as for example, the lines mentioning (1) the discomfort and the perspiration which accompany fever:

"With anguish moist and fever dew,"²

(2) sensations of thirst:

A homeward fever parches up my tongue--
O let me slake it at the running springs,³

(3) the feeling of heat which, in a feverous condition, seems localized in the forehead:

"A burning forehead, and a parching tongue,"⁴

and (4) a feverous condition of short duration:

"He had a fever late, and in the fit."⁵

¹"The Fall of Hyperion," Canto I, ll. 189-190.

²"La Belle Dame Sans Merci," III, l. 2.

³"Endymion," Book II, ll. 319-320.

⁴"Ode on a Grecian Urn," III, l. 9.

⁵"The Eve of St. Agnes," XII, l. 2.

Ten lines mention the condition of palsy, three being particularly descriptive of the state. The description cited below gives a graphic picture of palsy and age:

Met palsy half way: soon these limbs became
Gaunt, wither'd, sapless, feeble, cramp'd, and lame.¹

Implied in the following reference to palsy is the involuntary shaking of the hand:

"And grasp'd his fingers in her palsied hand."²

Seven references to convulsion are present in Keats's poetry. Most of these, while using the term "convulsed," are figurative usages. The line below, however, employs the term more or less literally:

"Making slow way, with head and neck convuls'd."³

Though the four references to ague, or aguish conditions, are figuratively employed, the very selection of the images is significant. Two lines mention apoplexy, which is a term not ordinarily considered poetic. The following line mentions apoplexy, suggesting its serious moment:

"Pray Heaven it end not in apoplexy."⁴

The other mention of the term is cited in the line below:

"It went for apoplexy--foolish folks."⁵

¹"Endymion," Book III, l. 637.

²"The Eve of St. Agnes," XI, l. 7.

³"Hyperion," Book I, l. 262.

⁴Otho the Great, II, iii, 49.

⁵"The Cap and Bells," LXXVIII, l. 2.

One reference each to gout,¹ asthma,² and deformities³ may be noted in Keats's poems. Such terms are medical in origin and are indicative of the fact that the poet drew upon his hospital training in writing his poetry. Other single references indicating an interest in pathological physical conditions concern coughing,⁴ a chapped condition,⁵ and pimples.⁶

Pallor, fatigue, and weakness are mentioned frequently in the poems of Keats. The fact that there are seventy references to pallor indicates that the poet was accustomed to observing the condition. Some of the references speak of paleness, wanness, or pallor in connection with illness; others suggest excitement as the causal factor; and still others are figuratively employed. The line below indicates the relation between pallor and illness:

"Pale was his face, he still look'd very ill."⁷

In picturing the miseries of the world, Keats suggests the wasting away of youth in pain, using the terms "pale" and "spectre-thin":

"Where youth grows pale, and spectre-thin, and dies."⁸

¹"A Song About Myself," II, l. 4.

²"Sonnet to Mrs. Reynold's Cat," l. 10.

³"Endymion," Book III, l. 503.

⁴"The Cap and Bells," XII, l. 9.

⁵Otho the Great, II, i, 33.

⁶"Two or Three," ll. 3-4.

⁷"The Cap and Bells," LXVIII, l. 5.

⁸"Ode to a Nightingale," III, l. 6.

Pallor as an index to pain is suggested in the line below:

"Swoon'd, murmuring of love, and pale with pain."¹

Likewise, the following reference to pain refers to pallor:

"Keeps head against the freshets. Sick and wan."²

By the use of another term, Keats suggests pallor in the next line:

"So haggard and so woe-begone."³

Fatigue is mentioned eleven times, though only five or six times is the term employed in its literal, definite, non-antithetical sense. The following line discusses fatigue from the physician's attitude:

This should cheer up your Highness--weariness
Is a good symptom, and most favorable.⁴

The line below also suggests the physician, in that it speaks of a man's complaining of fatigue:

"Once he complained of weariness."⁵

Weariness, or strain, of a definite part of the body, in this case, of the eye, is mentioned in the line quoted below:

"And ever watchful with fatigued eye."⁶

Fatigue of the entire body is suggested in the next line:

"Writhing her little body with ennui."⁷

¹"Lamia," l. 289.

²"Isabella," XXVII, l. 5.

³"La Belle Dame Sans Merci," III, l. 2.

⁴Otho the Great, V, iv, 56-57.

⁵Otho the Great, V, iv, 45.

⁶"Ode on Indolence," III, l. 7.

⁷"The Cap and Bells," IX, l. 2.

Of the twenty-six references to fainting, only a few of them refer to the physical process undergone by a specific person in which consciousness is lost. The following line is an example of the literal usage of the term applied to a person:

"The Lady fainted and he thought her dead."¹

The next line, also, suggests the loss of consciousness:

"His senses had swoon'd off: he did not heed."²

Approximately ten references to insanity are noted in the poetry of Keats, five of which concern idiocy and five of which talk of madness. Whether Keats was conscious of the distinction between the loss of reason and hereditary feeble-mindedness when he wrote:

"Aye, if a madman could have leave to pass a healthful day,"³ it is impossible to know. Yet his use of the word "healthful" indicates that he thought of insanity as a deviation from the normal, healthful state. In a passage concerning poetic imagination, unfettered by the restraining intellect, as a cause of madness, the poet says:

To high above our head,
Affrighted do we gaze
After its airy maze,
As doth a mother wild,
When her young infant child
Is in an eagle's claws--
And is not this the cause
Of madness?--God of Song,
Thou bearest me along
Through sights I scarce can bear:
O let me, let me share

¹"Ben Nevis," l. 69.

²"La Belle Dame Sans Merci," III, l. 2.

³"Lines Written in the Highlands.....," l. 25.

With the hot lyre and thee,
The staid Philosophy.¹

IV. References to Bacteriology and Surgery

In view of the vital part which microorganisms play in the modern ideas and practice of medicine, it is difficult for us to realize the status of bacteriology in the first two decades of the nineteenth century. For, at this time, scientists did not believe in the germ theory of disease which revolutionized the field of medicine when it became indisputably known. The reasons for the slow development before the middle of the nineteenth century were four in number:

- (1). The compound microscope had not yet been developed. Though Leeuwenhoek, a Dutch lens maker, had constructed a combination of lenses to use as a simple microscope and had made one of the first records of observation of bacteria in 1683, not until the latter part of the nineteenth century were the oil of immersion lens and sub-stage objective, which played a significant part in later study of bacteria, introduced into bacteriological work.
- (2). The theory of spontaneous generation was not accepted at this time. In some form or other, the idea that microscopic life originated de novo from something else existed until comparatively recent times. The Greeks believed that frogs and vermin originated spontaneously from mud. Spallanzani (1777) suggested that the spontaneous generation theory was false, offering as proof his findings that bacteria usually did not develop in boiled and hermetically sealed containers. Conclusive proof of his theory, however, was not forthcoming until after the time during which Keats studied medicine.
- (3). It was not believed until the time of Pasteur that microorganisms are responsible for fermentation and decay.
- (4). Though Plenciz (1762) stated a theory of the relationship of microorganisms to disease, he could not prove his theory;

¹"A Drought of Sunshine," ll. 26-38.

so it was not accepted. The first acceptable proof "of the probable causal relationship of organisms to disease was secured by Davaine in 1863."¹

From the facts given in the four preceding statements, the reader sees that Keats did not know of the relation of bacteria to disease when he wrote:

"Why was not I crush'd--such a pitiful germ?"²

Nor did he know the term "bacteria," which was introduced by Cohn in the latter part of the century. His use of the word "germ," however, indicates that he was aware of the existence of microörganisms. Three references to "pestilence" and one to "plague," terms which had been familiar since the middle ages, further indicate Keats's interest in medicine, for pestilence and plague referred to highly contagious diseases of unknown etiology, which frequently made devastating ravages upon whole geographical areas. In speaking of the pestilence, Keats says:

'Where is thy misty pestilence to creep
'Into the dwellings, through the door crannies.'³

Surgery, as well as bacteriology, was still in a comparatively crude stage in Keats's time. Anaesthetics had not been introduced; so even minor surgery must have been tremendously painful. It was not only painful, but no doubt exceedingly dangerous; for aseptic and antiseptic methods had not yet eliminated most of the dangers of infection. To illustrate

¹Estelle D. Buchanan and Robert Earle Buchanan, Bacteriology for Students in General and Household Science (3rd ed.; New York: The MacMillan Company, 1932), p. 10.

²"Hymn to Apollo," l. 23.

³"The Fall of Hyperion," Canto I, ll. 205-206.

the fact that the practices of the middle ages were continued in Keats's time, we have only to remember the type of ornately carved surgical instruments which were employed. Keats speaks of a knife in two instances¹ and of a "bony saw" in another² to indicate his interest in the science.

V. References to Obstetrics and Embryology

Obstetrics in the time of Keats was still a comparatively crude science. Since the etiological factor of puerperal fever, a staphylococcus bacterium, and the prophylactic methods of anti-septic and aseptic surgery were unknown in Keats's time, it was not an unusual thing for whole wards of maternity cases to die.³ Professor Thorpe, in speaking of this fact and of its effect upon Keats, says,

Keats served his term as a surgeon's apprentice, and must have seen at first hand some of the misery that sickness and disease bring. Before the days of improved methods and twilight sleep the practice of obstetrics furnished experiences that would move a heart of stone, while the crude surgery of the time, unalleviated by the blessing of anaesthetics, must have been a recurrent agony to a witness of Keats's sensitive nature.⁴

That Keats was deeply moved by such scenes is indicated in a passage from a letter to Benjamin Bailey:

One saying of yours I shall never forget--you may not recollect it--it being perhaps said when you were looking on the Surface and seeming of Humanity alone, without a thought of

¹"Isabella," XLII, l. 5, l. 7.

²"Endymion," III, l. 263.

³Edwin O. Jordan, A Text Book of General Bacteriology (Philadelphia: W. B. Saunders Company, 1928), p. 214.

⁴Thorpe, op. cit., p. 77.

the past or the future--or the deeps of good and evil--merely you said, "Why should woman suffer?" Aye, why should she? "By heavens, I'd coin my very soul and drop my Blood for Drachmas." These things are, and he who feels how incompetent the most skyey Knight-errantry is to heal this bruised fairness, is like a sensitive leaf on the hot hand of thought.¹

In his poetry, also, Keats speaks of the pain attendant upon childbirth:

She was born at midnight in an Indian wild,
Her mother's screams with the striped tiger's blent.²

In another passage, the poet refers to a still birth,³ further illustrating his interest in obstetrics.

Embryology, in Keats's time, had not yet entered upon its modern state of development.⁴ Yet the subject had been

¹Quoted in Thorpe, op. cit., p. 77.

²"The Cap and Bells," XLIV, l. 4.

³"Endymion," Book IV, l. 371.

⁴The earliest treatise on embryology which has been preserved is that of Aristotle (384-322 B. C.) entitled "De Generatione Animalium,"--concerning the generation of animals. This work describes the reproduction and development of many kinds of animals. It contains the first account of the development of the hen's egg, day by day, so far as it could be seen with the naked eye....Notable among his speculations is one which has been given the name "epigenesis." From his observations on the development of the hen's egg he concluded that development always proceeds from a simple formless beginning to the complex organization of the adult.

Another famous name in embryology is that of William Harvey (1578-1657). His book ("Exercitationes de Generatione Animalium") is largely based on the development of the chick, which he described in great detail, although he too was limited by the fact that the microscope had not yet come into general use. One of his contributions was a careful study of the development of the deer, which he compared with that of the chick. From purely theoretical considerations he came to the conclusion that mammals also formed eggs, and is responsible for the dictum "Ex ovo omnia"--all animals arise from eggs.

After the invention of the microscope, Marcello Malpighi (1628-1694) published an account of the development of the hen's egg ("De Ovo Incubato"), illustrated with excellent figures of development from the 24-hour stage of incubation on. His work was responsible for a theory of "preformation" as opposed to Aristotle's "epigenesis." On theoretical grounds, he held that

studied by scientists since Aristotle. The fact that Keats uses the word "embryo" is proof of his interest in that branch of science, because the term is not one ordinarily used in poetry:

"Each one himself a king in embryo."¹

In another reference, the poet speaks of the hatching of a dove's eggs:

Arise then! for the hen-dove shall not hatch
Her ready eggs,.....²

the various parts of the embryo were contained in the egg and became visible as they increased in size. The enthusiasm resulting from the remarkable discoveries made with the newly invented microscope led to many later and wholly imaginative accounts of homunculi--miniature adults--in eggs or sperms, respectively.....

Karl Ernst von Baer (1792-1876) is known as the "father of modern embryology." He discovered the egg of mammals in 1827 and published a book on animal development (1828-1837) in which he compared in detail the development of different animals. From these he drew four important conclusions, known as von Baer's laws. Waldo Shumway, Introduction to Vertebrate Embryology (3rd ed., New York: John Wiley and Sons, Inc., 1935), p. 10-13.

¹Otho the Great, I, iii, 17.

²"Endymion", Book III, ll. 1025-1026.

CHAPTER III

PHYSIOLOGY AND ANATOMY IN KEATS'S POETRY

There is significance in the frequency and variety of Keats's references to different parts of the body and to normal physiological processes. Mention of eyes and hearts is common, of course, in the language of poetry, for these organs captured the imagination of the poet long ago. It is unusual, however, to find nerves, gums, the brain, corns, wrinkles, ribs, the palate, and knuckles receiving poetic treatment. Such subjects, before the nineteenth century, were not considered especially poetic. Having an inherent prosaic quality and failing to arouse a poet's interest, they awaited the appearance of Keats, whose works show a very distinct consciousness of physiology and anatomy.

I. The Physical Body as a Whole

Although comments upon physical forms, figures, and shapes are outnumbered by references to parts of the head, to the appendages, to integumentary modifications, to the parts of the trunk, or to internal or skeletal anatomy, the presence of these less frequent allusions is significant because it indicates the poet's feeling for the living, physical organism. There are references to the body as a whole, to nakedness or nudity of an organism, to forms of bodies in general, and to shapes, in the sense of bodies. Others which relate in some way to the living body are miscellaneous references to stature, weight, and bodily

sense.¹

A sense of form, three-dimensional living form, is characteristic of Keats. One sees the beings which he describes as characters in the round; one does not visualize them as portraits on an artist's canvas. This effect upon the reader comes from the poet's consciousness of anatomical form and his consequent use of such terms as seem best to convey this consciousness to the reader; as for example: (1) the flesh-and-blood body in a state of growth:

"Their heads appear'd, and up their stature grew,"²

(2) the consciousness of form somewhat nebulous and reminiscent of Milton:

"Regal his shape majestic, a vast shade,"³

(3) the grace of the female body:

"The dazzling sun-rise: two sisters sweet,
Bending their graceful figures till they meet."⁴

"Give me my woman's form, and place me where he is,"⁵
and of the male body:

"Had I a man's fair form, then might my sighs,"⁶

(4) the consciousness of one's own body:

"And, at the moment, felt my body dip."⁷

¹The approximate frequency of these references is indicated within parentheses: body (14), nudity (8), forms (11), shapes (8), miscellaneous (8).

²"Hyperion," Book II, l. 87.

³Ibid., l. 372.

⁴"Sleep and Poetry," l. 368.

⁵"Lamia," l. 120.

⁶"To....," l. 1.

⁷"Endymion," Book I, ll. 663-664.

Such direct references to the human body are typical of at least thirteen other examples which occur in Keats's poetry and which show anatomical consciousness. Some examples describe or suggest qualities possessed by the body; movement, for instance, finds expression in the following line, through the use of an antithetical term:

"His sluggish form reposing motionless."¹

II. References to the Head and Its Parts

In his use of terms pertaining to various parts of the body, Keats is most lavish in his mention of various parts of the head. From his complete poetical works, the investigator has noted approximately 1,631 references, exclusive of those which refer to skeletal anatomy, to the body as a whole, and to its activities. More than fifty percent of these concern the various parts of the head. Such high frequency of reference indicates that the poet must have been especially interested in this part of the body.

The student is also impressed by the variety and scope of these references to the head. Following the tradition of poets before him, Keats is interested in the eyes, the brow, the mouth, the lips, the lids, and the cheeks. He expands the area, however, by referring also to the eyeballs, to the chin, and to the temples. Thus, while writing about poetic subjects less favored, Keats amazes us with his discussion of the parts of the head. Not very much has escaped his attention, for a complete list includes lines which mention at least 21 items.

¹"Endymion," Book IV, l. 389.

The eye is spoken of 300 times, and the face, the head, and the lips are next in frequency.¹ The larger number of these are direct references to the human head or its parts, but there are some which refer to the heads of animals.² A few others are indirect and figurative; as for example:

"With browless idiotism--o'erwise phlegm."³

In speaking of the eyes, which are mentioned more than any other part of the body, Keats is doing more than merely employing a poetic reference. He is mindful of anatomy, seeing physical aspects:

"Close up its bloodshot eyes, nor see despair,"⁴
and mentioning rheum:

"Rheum to kind eyes, a sting to humane thought."⁵

Though the larger number of references to the eye are similar to the two examples cited, there are in the earliest poems, some which discuss the organ in a conventionally poetic fashion; as for example:

"For large white plumes are dancing in mine eye."⁶

¹The frequency of each part is stated in parentheses: eye (300), head (97), face (97), lips (93), ear (80), brow (45), cheeks (41), forehead (31), eyelids (31), mouth (17), features (10), temples (7), nose (7), eyelashes (5), chin (5), countenance (4), nostrils (4), jaw (3), eyebrow (2), maw (3), front (2), eyeballs (1).

²See, for example, "I Stood Tip-toe.....," l. 72, and "Endymion," Book I, l. 76.

³"To Haydon, With a Sonnet Written On Seeing the Elgin Marbles," l. 12.

⁴"Endymion," Book IV, l. 308.

⁵"Endymion," Book III, l. 286.

⁶"Specimen of an Induction to a Poem," l. 2.

Keats's interest in physiology and the anatomy of the eye are definitely apparent in the lines which discuss the salubrious effect of sleep on the eye:

Where those eyes are the brightest far that keep
Their lids shut longest in a dreamless sleep,¹

and in the reference concerning the structure of a fish's eye:

....and the minutest fish
Would pass the very hardest gazer's wish,
And show his little eye's anatomy.²

In like manner, Keats speaks of the ear³ in a physiological sense, contrasting physically audible songs with those which speak to the spirit:

Not to the sensual ear, but, more endear'd,
Pipe to the spirit ditties of no tone,⁴

and referring directly to the physical ear in a bleeding condition:

"From them his ears gush'd blood; for them in death."⁵

Many of the references to the lips and teeth are physiological or anatomical in tone; as for example, the line which mentions the ruddy lips of a healthy person:

"The natural hue of health, from vermeil lips,"⁶

and the reference which gives the scientific name for wisdom

¹"Endymion," Book IV, ll. 541-542.

²"Endymion," Book III, l. 209.

³Since the subject of sound in Keats is comprehensive and since it has already been fairly well studied by scholars, the investigator has discussed sound and hearing only insofar as their connection with the physical ear is concerned.

⁴"Ode on a Grecian Urn," l. 3.

⁵"Isabella," XV, l. 3.

⁶"Endymion," Book IV, l. 148.

teeth:

"The dentes sapientiae of mice."¹

Similarly, the lines mentioning the face employ the word "face" with a physiological connotation; for example, in describing a face with the intention of arousing a feeling of repulsion in the reader, Keats speaks in physiological terms:

The thing was vile with green and livid spot,
And yet they knew it was Lorenzo's face.²

III. References to the Appendages and Parts of the Appendages

Next to the lines mentioning parts of the head, references to various parts of the bodily appendages are highest in frequency. Of the total number, 1,631, there are 375 references to the appendages. This is almost one-fourth of the total number of references to various parts of the body. In this way, especially, Keats indicates his interest in and knowledge of anatomy, for, not only are the hands, arms, legs, and feet mentioned frequently, but he mentions parts of the appendages found less often in poetry.³ Elaborately anatomical discussions create vivid pictures by specific references to bodily parts, sometimes with catalogues:

Light feet, dark violet eyes, and parted hair;
Soft dimpled hands, white neck, and creamy breast.⁴

¹"The Cap and Bells," XXXIII, l. 4.

²"Isabella," LX, ll. 4-5.

³The frequency of mention is stated within parentheses: limbs (25), elbows (6), fingers (32), fists (5), knuckles (1), palms (2), wrists (6), heels (12), toes (4), knees (13), ankles (6).

⁴"Woman! when I behold thee.....," ll. 15-16.

Some with upholden hand and mouth severe;
 Some with their faces muffled to the ear
 Between their arms; some, clear in youthful bloom.¹

Of the parts of the upper appendages, Keats speaks in a descriptive manner, mentioning "fat elbows":

"By following fat elbows up a court,"²
 speaking of the hand as a modern medical student would see it:

"His old right hand lay nerveless, listless, dead,"³
 describing an aged hand,

"And grasp'd his finger in her palsied hand,"⁴

"And with her fingers old and brown,"⁵
 talking about the knuckles:

"These treasures--touch'd the knuckles--they unclasp'd,"⁶
 and mentioning the fists:

"Secure! Methinks I have her in my fist."⁷

Though there are fewer references to the lower appendages, there are a number which are made with an eye to anatomical aspects. The following lines, for instance, refer to an anatomical condition commonly known as bow-leggedness:

And freckles many; ah! a careless nurse,
 In haste to teach the little thing to walk,

¹"Sleep and Poetry," ll. 143-145.

²"The Castle Builder," l. 19.

³"The Fall of Hyperion," Canto I, l. 323.

⁴"Hyperion," Book I, l. 18.

⁴"The Eve of St. Agnes," XI, l. 7.

⁵"Meg Merrilies," VI, l. 1.

⁶"Endymion," Book III, l. 672.

⁷Otho the Great, V, v, 107.

May have crumpt up a pair of Dian's legs,
And warpt the ivory of a Juno's neck.¹

Even the external anatomy of a cat becomes a subject, though of only humorous significance, perhaps, in the present study:

Thy tail's tip is nick'd off--and though the fists
Of many a maid have given thee many a maul.²

Further describing members of the lower appendages, Keats speaks of ankles:

What gentle squeezes he gave each lady's hand!
How tremblingly their delicate ankles spanned!³

In addition to referring directly to the appendages, many lines, as we see, indicate some such physiological condition as temperature:

"One minute before death my iced foot touched."⁴

IV. Parts of the Trunk

In point of number, references to parts of the trunk are less significant than those to the head or appendages. Of the 1,631 examples, 161 name parts of the trunk.⁵ To the casual reader, the extensiveness of this interest may not be apparent; but the research worker is amazed at the breadth of interest in this type of anatomy, which a careful tabulation indicates. Not only is the variety of references significant, but the

¹"Oh, I am frighten'd with most hateful thoughts," ll. 7-10.

²"Sonnet (To Mrs. Reynold's Cat)," l. 11.

³"Calidore," ll. 81-82.

⁴"The Fall of Hyperion," Canto I, l. 131.

⁵The frequency of reference is indicated within parentheses: neck (25), shoulders (22), back (9), breast (50), bosom (32), ribs (2), side (6), thighs (2), flanks (2), waist (7), belly (1), buttocks (1), loins (2).

manner in which he speaks of the trunk parts indicates a strong physiological interest; for instance, he speaks of quivering loins:

And many once proud-quiver'd loins did melt
In blood from stinging whip;--with hollow eyes.¹

In another instance, he speaks of a table high as a man's breast:

Twelve sphered tables, by silk seats insphered,
High as the level of a man's breast rear'd
On libbard's paws, upheld the heavy gold
Of cups and goblets....²

Speaking of the body of a fish, Keats refers to a part of its trunk:

"Their silver bellies on the pebbly sand."³

In many other instances, for imagery or concreteness, the poet ascribes parts of the physical trunk to objects; as for example, in the following line, he suggests a mountain's laughter:

"Did you get here? Oh I shall split my sides."⁴

V. The Integument and Integumentary Modifications

The references to the integument and its modifications are significant by their very presence. Not every poet is interested in the skin as such, in wrinkles, freckles, hair, beards, baldness, and corns. Those poets who do give evidence of such an interest in their poetry indicate, simultaneously, their interest in anatomy. In the poetry of Keats, the frequency

¹"Isabella," XIV, ll. 5-6.

²"Lamia," Part II, l. 184.

³"I stood tip-toe upon a little hill," l. 77.

⁴"Ben Nevis," l. 31.

of this type of material is not high.¹ Yet the references that the investigator has collected offer convincing argument for his interest in anatomy inasmuch as many of them concern specialized conditions of the human integument.

The term called "freckles," indicating a modification of the Malpighian layer of the skin, appears seldom in poetry; yet it is used by Keats in the line following:

"And freckles many; ah! a careless nurse."²

While integumental modifications have been considered unpoetic or have been neglected by the poets, the calloused epidermal condition of corns has certainly remained untouched. To the specialist in anatomy, however, no part of a living body would appear prosaic. In an amusing dialogue, Keats gives his readers Mrs. Cameron, speaking thus of corns:

'Tis true I had no corns--no! thank the fates,
My Shoemaker was always Mr. Bates.³

The subject of hair occurs more often in poetry than that of other modifications of the skin. But it is often discussed under such descriptive phrases as "hoary locks." When the poet makes a direct mention of "grey hair," however, he is interested in the hair itself and in the condition bringing about its change of color. If he uses the more poetic "hoary locks," the usage of which is traditional in poetry, his interest

¹The frequency of reference is stated within parentheses: skin (2), hair (16), beard (3), wrinkles (6), freckles (2), locks (of hair) (6), baldness (5), corns (1).

²"Oh I am frightened with most hateful thoughts," l. 7.

³"Ben Nevis," ll. 17-18.

in anatomy is less evident. The following line is one which mentions "grey hair":

"Aye, Conrad, it will pluck out all grey hairs."¹

VI. Internal Anatomy

There are 282 references to internal bodily structures in Keats's poetry.² Some of these, particularly comments upon the heart, have been long considered part of poetic language. Others, especially those concerning the brain and nerves, have not been used frequently in poetry.

Of the references to the internal anatomy of the upper part of the body, exclusive of those concerning the brain, those which refer to the throat and tongue are most numerous. The following passage on the throat illustrates an obvious consciousness of physiology and a specific knowledge of the conditions of a chill:

Burning--when suddenly a palsied chill
Struck from the paved level up my limbs,
And was ascending quick to put cold grasp
Upon those streams that pulse beside the throat.³

The next passage refers to an obstruction in the trachea, or respiratory tube, and further illustrates the poet's interest in this type of anatomy:

To this new-fangled vice, which seems a burr
Stuck in his moral throat, no coughing e'er could stir.⁴

¹Othe the Great, I, ii, 17.

²Frequency of reference is indicated by parentheses: palate (6), gums (1), teeth (9), tongue (51), throat (17), liver (2), entrails (2), intestine (1), heart (134), epleen (9), brain (38), nerves (11).

³"The Fall of Hyperion," Canto I, ll. 122-125.

⁴"The Cap and Bells," XII, ll. 8-9.

Physiological, also, particularly in its reference to thirst, is this line concerning the tongue:

A homeward fever parches up my tongue--
O let me slake it at the running springs!¹

The remainder of the references to internal anatomy of the upper part of the body are largely of the simple catalogue type, such as:

"Clench'd her small teeth, and held her lips apart."²

Visceral references largely concern the heart, though the liver, intestines, and spleen are mentioned several times. As previously stated in this discussion, the heart has long appeared in poetry. But it is the opinion of this investigator that Keats places more physiological meaning in his references to the heart than most other poets. To substantiate this opinion, a large number of the 134 references to the heart can be cited. The following line, for example, sees an analogy between man's existence and the function of the heart:

"From a man's little heart's short fever-fit."³

The following are typical of several examples which describe purely physical feeling in relation to the heart:

Then sudden it grew hot, and all the pains
Of an unnatural heat shot to his heart.⁴

"Grew stifling, suffocating, at my heart."⁵

¹"Endymion," Book II, ll. 319-320.

²"An Extempore," l. 43.

³"Ode on Indolence," IV, l. 4.

⁴"Lamia," Part II, l. 253.

⁵"The Fall of Hyperion," Canto I, l. 129.

Many lines refer to the heart's function of beating and furnishing blood for the body:

"His heart beat awfully against his side;"¹

His heart is full, it can contain no more,
And do its ruddy office.²

References to the spleen, unfortunately for the investigator, concern mental states rather than the vascular, gland-like organ near the stomach or intestine of most vertebrates. The line which follows, for example, uses the word in the sense of its older meaning, melancholy or malice:

"Turning into sweet milk the sophist's spleen."³

A few of the references to visceral organs are indirectly physiological; that is, they give organs to inanimate subjects; for instance, the mountain is spoken of thus:

"To search its sullen entrails rich with ore."⁴

The references to nerves and to the brain are of especial importance for several reasons. In the first place, they indicate an interest in a specialized type of internal anatomy. In the second place, the presence of numerous references to the brain and to nerves suggests that Keats's interest in physical sensation, which has been thoroughly studied by scholars, may have led to his mention of nerves. In the third place, the brain, because of its relation to the intellect, would naturally interest a poet who had a desire for knowledge. Though the

¹"Isabella," VI, l. 2.

²Otho the Great, V, iv, 23-24.

³"Lamia," Part II, l. 172.

⁴"The Fall of Hyperion," Canto I, l. 274.

science of psychology was then in a very early stage, the relation of impulses, arising from sensation, to the brain was known. Keats, the individualist, was interested in the mechanism of the brain through which mental processes of creative thought are effected. More than a century after Keats's death, a biologist has expressed this relation succinctly:

The most prized possession of mankind is the "capacity for individuality," yet even what passes for "free will" has its basis in the neurones and reflexes built up in the brain, that after all must be regarded as the mechanism through which consciousness, memory, imagination, and will are effected, rather than as the seat of these manifestations of the intellectual life.¹

Keats's references to nerves concern their relation to physical sensation.

There are several references which illustrate the first point given above: that Keats was interested in the anatomy, or, more specifically, the morphology of the brain. In the following lines he refers to the brain as being globed. Whether this description has reference to the fact that the brain "comprises four chief parts--the medulla oblongata, the pons varolii, the cerebellum, and the cerebrum,"² or whether the term "globed" refers simply to the convolutions of the individual parts, I cannot say. In any case, the reference is indicative of the

¹Herbert Eugene Walter, Biology of the Vertebrates (New York: The Macmillan Company, 1934), p. 631.

²Jesse Feiring Williams, A Text-Book of Anatomy and Physiology (Philadelphia: W. B. Saunders Company, 1925), p. 73.

author's familiarity with anatomy:

"Still swooning vivid through my globed brain,
"With an electral changing misery."¹

Another mention of the brain which has a particular anatomical interest is one which refers to the "marrow" of the brain. As a rule, one thinks of marrow as the tissue filling the cavities of most bones, but the term, in anatomy, also indicates that part of the brain known as the medulla. So the following line also indicates familiarity with anatomy:

"And from the teeming marrow of thy brain."²

The second point, that there are several references to the brain which concern its relation to sensation, is illustrated by the following line, which suggests the effect produced upon the brain by an intoxicating liquid:

"But when the happy vintage touch'd their brain."³

There are several references to the brain in connection with its relation to knowledge. Such references as the following illustrate Keats's consciousness of the relation of knowledge to the processes occurring in the brain:

"Not one hour old, yet of sciential^[4] brain."⁵

In speaking of the brain's limited capacity for knowledge, Keats again illustrates the third point, in the following

¹"The Fall of Hyperion," Canto I, ll. 245-246.

²Otho the Great, I, i, 94.

³"Lamia," Part II, l. 203.

⁴Having efficient knowledge.

⁵"Lamia," Part I, l. 191.

line:

"Though the dull brain perplexes and retards."¹

Another aspect of the brain, its imaginative capacity, is suggested:

"Such dim-conceived glories of the brain."²

The filamentous or cordlike bands of nervous tissue which conduct impulses from parts of the nervous system to other organs are suggested in Keats's poetry by such terms as "nervous," "nervy," and "unnerved" when the term "nerves" itself is not used. The reference quoted below illustrates the relation of nerves to the sensation of pain:

Shall sprawl distracted! O that that dull cowl
Were some most sensitive portion of thy life,
That I might give it to my hounds to tear!
Thy girdle some fine zealous-pained nerve
To girth my saddle!.....³

In the same fashion, the next line refers to the relation of nerves to pain:

"But horrors, portioned to a giant nerve,
"Make great Hyperion ache."⁴

The line following, however, does not indicate the relation of nerves to pain, but to a "nervous" condition of general sensitivity to nervous impulses:

"Here Homer with his nervous arms."⁵

¹"Ode to a Nightingale," IV, l. 4.

²"Two Sonnets," II, l. 9.

³Otho the Great, III, ii, 92-96.

⁴"The Fall of Hyperion," Canto II, ll. 22-23.

⁵"Ode to Apollo," l. 7.

VII. Skeletal Anatomy.

By the use of such terms as "bones," "marrow-bones," and "skull," Keats indicates a certain amount of interest in the anatomy of the skeleton. Although a few of his references to bones are of the conventional type¹, the majority are scientific in import; as for example, the direct references to bone marrow:

"And many on their marrow-bones for death prepar'd."²

"Hale strength, nor from my bones all marrow drain'd."³

Though the skull has been employed in literature as the symbol of the brevity of human life, the reference following refers to the space included within the skull:

"In the dark secret chambers of her skull."⁴

One reference to the skeletons of different animals has a peculiar significance. Keats catalogues a list of fossils, man and animal, in such a manner as to suggest to the modern reader the possibility that the comparison of vertebrate skeletons had occurred to him. In order that the idea of Keats's interest in comparing skeletons may not seem unusual in view of the time in which he lived, the record of a man who lived long before Keats's time and who studied human and animal

¹Such as the line referring to "my parents' bones":
"Lamia," Part II, l. 94.

²"The Cap and Bells," LXXVI, l. 9.

³"Endymion," Book III, l. 614.

⁴"The Fall of Hyperion," Canto I, l. 278.

skeletons, noting similarities between the two, is quoted below:

Pierre Belon (1518-1564) wrote on his travels, on the Dolphin, on aquatic animals and on birds.....In his introduction occurs the much cited comparison of the human skeleton and that of a bird. The two skeletons are placed in the same position and the corresponding bones are identified. He took the true clavicle of birds (the wish-bone) for a special bone of birds and erroneously identified the human clavicle with the coracoids.¹

Doubtless many other men besides Belon had studied animal and human skeletons before Keats's time. It may be that Keats was not thinking of comparing them when he wrote the lines mentioning animal and human skeletons which will be quoted later in the discussion. Charles Robert Darwin (1809-1882) was destined to do this and to suggest, more plausibly than ever before, the possibility of man's evolution from lower vertebrates. The science of real comparative anatomy, therefore, was introduced after Keats. Nevertheless, the following reference indicates that Keats was interested in skeletons of different kinds:

Of ancient Nox;--then skeletons of man,
Of beast, behemoth,² and leviathan,³
And elephant, and eagle, and huge jaw
Of nameless monster. A cold leaden awe.⁴

¹William Lacy, The Growth of Biology (New York: H. Holt and Company, 1925), p. 64.

²An animal, probably the hippopotamus, described in Job 11:15-24.

³An aquatic monster, interpreted variously as a crocodile (Ps. 74:14), a whale (Ps. 4:26), and as a dragon (Is. 27:1).

⁴"Endymion," Book III, ll. 133-136.

VIII. References to Physiological Processes

If frequency is the index to interest, then respiration is certainly the physiological process which most interested Keats. His own respiratory system was weak, and he suffered from the respiratory disease, tuberculosis, which eventually resulted in his death. Perhaps this fact accounts for his interest in the process of breathing, though there is no proof to substantiate the supposition. Whatever the source of his interest, the fact remains that he mentions breathing, directly, more than 103 times. In six references, there are indirect allusions to breathing in the terms "suffocate,"¹ "heart-stifled,"² "stifling," "suffocating,"³ and "stifle."⁴ The term "respire" is used three times. "Pant," panting," and "panted" are respiratory terms which Keats employs ten times in his poetry. Exhalation is referred to three times, though in an indirect manner.⁵

Many aspects of breathing are mentioned; as for example, breathing as an indication of life:

"One sign of real breath--one gentle squeeze,"⁶
normal breathing as an indication of health:

"Full of sweet dreams, and health, and quiet breathing,"⁷

¹Otho the Great, V, 1, 22.

²"The Eve of St. Agnes," XXIII, l. 9.

³"The Fall of Hyperion," Canto I, l. 129.

⁴Otho the Great, V, 1, 18-19.

⁵"Endymion," Book IV, l. 349, Book II, l. 663, l. 723.

⁶"Endymion," Book IV, l. 665.

⁷"Endymion," Book I, l. 5.

the disturbances of the respiratory system induced by the inhalation of poison:

Not the discolored poisons of a fen,
Which he who breathes feels warning of his death,¹

the effect produced upon breathing by excitement or mental disturbances:

"Had put a sudden stop to my hot breath,"²
difficulties in breathing, which the poet himself must have experienced:

"To smother up this sound of labouring breath,"³

"Were pent in regions of laborious breath,"⁴
the regulation of breath in relation to speech:

When one can compass it. Auranthe, try
Your oratory--your breath is not so hitch'd,⁵

the effect of strenuous exercise upon breathing:

As of some breathless racers whose hopes poize
Upon the last few steps, and with spent force,⁶

voluntary control of the breath:

"For them the Ceylon diver held his breath,"⁷
and condensation of the moisture in the air produced by the

¹Otho the Great, II, i, 23.

²Otho the Great, II, iii, 4.

³Otho the Great, V, i, 129.

⁴"Hyperion," Book II, l. 22.

⁵Otho the Great, V, ii, 47-48.

⁶"Endymion," Book II, l. 924.

⁷"Isabella," XV, l. 1.

exhalation of breath higher in temperature than that of the surrounding atmosphere:

"His rosary, and while his frosted breath."¹

The physiological processes of tremors, addition of weight, perspiration, nursing, bodily decay, belching, swallowing, touch, hunger, taste, thirst, circulation, and sensation in general are also mentioned or suggested in Keats's poetry; as for example, the palpitations of trembling:

"He spake, and, trembling like an aspen-bough,"²
addition of avoirdupois:

And cooling the drouth
Of the salmon's mouth,
And fattening his silver gill,³

sweating:

"His Druid locks to shake and ooze with sweat,"⁴
physiological decay:

"From his north cavern. So sweet Isabel
By gradual decay from beauty fell."⁵

Sensation in general, touch, hunger, taste, and thirst are processes which are mentioned frequently by Keats. They have been studied by scholars, however, to a great extent in their capacity of sensation. It is the purpose of this study to emphasize the physiological aspects of the sensation. For

¹"The Eve of St. Agnes," I, l. 6.

²"Endymion," Book III, l. 747.

³"Teignmouth," II, l. 6.

⁴"Hyperion," Book I, l. 137.

⁵"Isabella," XXXII, l. 8.

instance, there are several references to thirst which, like the following, are purely physiological in import:

Dost thou now please thy thirst with berry-juice?
O think how this dry palate would rejoice!¹

The larger number of the references to taste are figurative, but the line following illustrates an interest in physiology:

He seem'd to taste a drop of manna-dew;
Full palatable; and a colour grew.²

Hunger is suggested in approximately forty-seven references. Approximately half of this number have a figurative usage. The remainder refer to bodily physiology. The following passage, for instance, concerns the physical necessity of the body for food:

Thy flesh, near cousin to the common dust,
Will parch for lack of nutriment--thy bones
Will wither in a few years,....³

Quality of food is discussed:

Eats wholesome, sweet, and palatable food
Off Gloucester's golden dishes--drinks pure wine,
Lodges soft?⁴

In addition to noting the necessity of the body for food and mentioning the wholesome, appetizing quality of certain foods, Keats also refers to the pangs of hunger:

"And seldom felt she any hunger-pain."⁵

¹"Endymion," Book II, ll. 327-328.

²"Endymion," Book I, ll. 766-767.

³"The Fall of Hyperion," Canto I, ll. 109-111.

⁴King Stephen, I, iv, 26-28.

⁵"Isabella," LIX, l. 5.

Desire for food, or appetite, is mentioned several times. The next line, for example, mentions the effect of love upon the appetite:

"Forget their tea, forget their appetite."¹

In addition to mentioning the four aspects of hunger already noted, Keats refers indirectly to the actual process of eating, as well as the social pleasure derived therefrom:

They could not sit at meals but feel how well
It soothed each to be the other by.²

Only two or three direct references to touch which have a physiological tone are to be found in Keats's poetry; as for example,

"Ah! through their nestling touch."³

Circulation of the blood is a physiological process which received a large amount of attention in Keats's poetry. Anyone who is interested in physiology should take a great deal of interest in circulation, since it is the process by means of which the body is nourished and by which it is enabled to carry on its life activities. The student is not disappointed in his search through Keats's poetry for an indication of such interest.

Of some forty references to circulation, twenty-two refer to the pulse of blood, seven of which usages are figurative. Thirteen references, physiological in tone, concern the veins. Four times, Keats uses the term "vein" in its figurative sense.

Various aspects of the pulse are discussed in the references. The effects of excitement, languor, pain, love, and

¹"A Party of Lovers," l. 4.

²"Isabella," I, ll. 5-6.

³"Lines," I, l. 4.

intoxicants upon the pulse rate are discussed. The following lines, for instance, refer to the effect upon the heart beat (and, consequently, of the pulse rate) of a state of mental excitement:

I saw thee, and my blood no longer cold
Gave mighty pulses: in this tottering case
Grew a new heart, which at this moment plays
As dancingly as thine.....¹

The opposite effect, that of the retarding of the pulse rate, produced by drowsiness is suggested by the line below:

"Benumb'd my eyes; my pulse grew less and less."²

Heightened pulse rate in a condition which produces pain is mentioned in the next line:

"Your pulse is shocking, but I'll ease your pain."³

The physician's attitude is evident in the line following, which refers to the effect of love on the pulse rate:

Feel, feel my pulse, how much in love I am;
And if your science is not all a sham.⁴

Whether the line quoted below refers to a quickened heart beat or to the warm, suffusing glow produced by intoxication, it is impossible to say. In any case, the line does refer to some condition of the pulse:

"My pulse is warm with thine own Barley-bree."⁵

¹"Endymion," Book III, ll. 304-307.

²"Ode on Indolence," II, l. 7.

³"The Cap and Bells," XLVIII, l. 3.

⁴"The Cap and Bells," XLV, ll. 4-5.

⁵"Written in the Cottage Where Burns Was Born," l. 5.

Color of the veins, the effects of warfare, shame, intoxication, and coldness upon the veins, and distention of the enclosing vessels are suggested in references which mention the blood vessels. The line below refers, for instance, to the characteristic blue tinge of the blood in the veins:

"More bluely vein'd, more soft, more whitely sweet."¹
In the following, the term "veins" seems to refer to a "blood containing vessel" rather than a special type of blood vessel in contradistinction to arteries, which carry blood reddish in tinge:

"So in my veins red life might stream again."²
Color is discussed in the following reference to veins, also, in a manner indicating an interest in physiology:

"In one whose brow had no dark veins to swell."³
The distention of blood vessels and consequent reddish flush is mentioned in connection with the blush of shame, which is produced by a general suffusion of blood through the capillaries of the face, in the lines below:

If shame can on a soldier's vein-swoll'n front
Spread deeper crimson than the battle's toil.⁴

Size of the veins is mentioned in the term "full-vein'd":

"Their full-vein'd ears, nostrils blood wide, and stop."⁵
The part played by the circulatory system in equalizing the

¹"Endymion," Book I, l. 625.

²"Lines Supposed To Have Been Addressed To Fanny Brawne,"
l. 6.

³"Lamia," Part II, l. 77.

⁴King Stephen, I, i, 1-2.

⁵"Endymion," Book IV, l. 400.

temperature of the body is considerable. That Keats was conscious of this fact is illustrated by the line following:

"'Twas icy, and the cold ran through his veins."¹

IX. Conclusion

In concluding her study of physiology and anatomy in the poetry of John Keats, the investigator wishes to explain her reasons for dealing with extremely minute details. Several thousand references were collected and classified in order to see what types of anatomical studies and what aspects of physiology most interested the poet. After collecting the references, the investigator was surprised at the total frequency, concluding that the tedious work had been worthwhile, since it furnishes indisputable proof that Keats employed his considerable knowledge of physiology and anatomy in his poetry.

¹"Lamia," Part II, l. 251.

CHAPTER IV

During the period in which Keats lived and wrote, scientific ideas were being born with great rapidity. The search for truth was pitiless, having gained impetus from the rationalistic thought and methods of the eighteenth century. Voltaire and the other iconoclasts had applied the scientific, inductive, Baconian method of thought to many cherished faiths and beliefs, attacking the church with a disastrous effect. Belief in the divine right of kings was declared absurd and unintelligent. Corruption in the Holy Church was brought to light and its ritual ridiculed. Whole creeds were rejected by many enlightened, intelligent men, while the majority, perhaps, still clung tenaciously to the old faiths. The uprooting of deeply settled convictions necessitates a supreme intellectual readjustment. Evidence of the unrest caused by all this scientific reasoning is found throughout the period. But it is the effect of such thought upon Keats's ideas with which this work is concerned. If he could not accept the old religious faiths, what effect did this have upon his ideas and upon his psychology? Though there are few poems in which he discusses his views upon the subject, the sonnet, "Written in Disgust of Vulgar Superstition," is significant. In it, he states that he thinks the old church creeds are outworn. The reader wonders whether this lyric indicates that the poet felt doubt and cynicism, as did many men of his period, and as many men of the present are continuing to do. Yet the latter part of the poem shows the poet

convinced that man's rejection of the old customs is but a step forward in the acceptance of higher and nobler beliefs. The poet, then, considers scientific thought to be an emancipator in regard to religion. Such a view is evident in:

The church bells toll a melancholy round,
 Calling the people to some other prayers,
 Some other gloominess, more dreadful cares,
 More hearkening to the sermon's horrid sound.
 Surely the mind of man is closely bound
 In some black spell; seeing that each one tears
 Himself from fireside joys, and Lydian airs,
 And converse high of those with glory crown'd.
 Still, still they toll, and I should feel a damp,--
 A Chill as from a tomb, did I not know
 That they are dying like an outburnt lamp;
 That 'tis their sighing, wailing ere they go
 Into oblivion;--that fresh flowers will grow,
 And many glories of immortal stamp.¹

Besides being instrumental in producing great changes in religious and social values, the inductive, scientific thought of Keats's time produced more tangible results. Men with a scientific turn of mind began to renew their interest in astronomy, chemistry, physics, and geology. The pseudo-sciences, palmistry and astrology, occupied more respectable positions in the scientific horizon than they do at the present time. Alchemy, the predecessor of modern chemistry, had been somewhat displaced. The stage was set, so to speak, for the specialization of modern science to enter; but it was an age of trail blazers who had to make mistakes in order to find real scientific truth. The chapter following will discuss Keats's knowledge of astronomy, chemistry, physics, geology, and the pseudo-sciences.

¹"Written in Disgust of Vulgar Superstition," ll. 1-14.

I. Astronomy in Keats's Poetry.

There is sufficient evidence in the poetry of Keats to prove that he was interested in astronomy and had some definite knowledge concerning the science. In addition, there is evidence to prove that such knowledge influenced his thinking. He mentions the moon and the stars, of course, more frequently than any other astronomical subjects. The dreamer and the poet have always been inspired by the mysterious moon and the twinkling stars. Perhaps this fact may account for some of the fifty-six references to stars and the thirty-three references to the moon. But there are numerous references to specific stars and planets which can be explained only by the fact that the poet was also a student of astronomy. The reference following is a good example of his acquaintance with astronomy:

Crystalline brother of the belt of heaven
 Aquarius! to whom king Jove has given
 Two liquid pulse streams 'stead of feather'd wings,
 Two fan-like fountains,--thine illuminings
 For Dian's play:
 Dissolve the frozen purity of air,
 Let thy white shoulders silvery and bare
 Show cold through watery pinions; make more bright
 The Star-Queen's crescent on her marriage night:
 Haste, haste away!--
 Castor has tamed the planet Lion, see!
 And of the bear has Pollux mastery:
 A third is in the race! who is the third
 Speeding away swift as the eagle bird?
 The ramping Centaur!
 The Lion's mane's on end: the bear how fierce!
 The Centaur's arrow ready seems to pierce
 Some enemy: far forth his bow is bent
 Into the blue of heaven. He'll be shent,
 Pale unrelentor
 When he shall hear the wedding lutes a playing.¹

The Pleiades,² or the seven sister stars, are mentioned; the

¹"Endymion," Book IV, ll. 581-601.

²"Hymn to Apollo," l. 25.

evening star, or Hesperus¹ is another specific star described in Keats; and the Milky Way is mentioned as the Galaxy.² Vesper,³ another name for the evening star, is mentioned twice.

Besides the references to the moon, to the stars, and to specific constellations, there are lines mentioning the firmament, clouds, the universe, the heavens, the sky, the sun, space, the polar ray, the ether, the spheres, the dizzy void, the earth, meteors, planets, globes, orbs, the zenith, and comets.⁴ During Keats's time, the rarefied element present in the space of the universe was known as the "ether." This term the poet uses to suggest void in a sonnet which talks about the release, to one who has been living in a crowded city, of looking at the sky and mourning that the day has passed:

E'en like the passage of an angel's tear
That falls through the clear ether silently.⁵

Though the reference following does not mention a specific constellation, it further illustrates the poet's interest in astronomy by the use of the term, "comet":

"How like a comet he goes streaming on."⁶

There are other references which indicate that the poet was

¹"Written in Answer to a Sonnet Ending Thus," ll. 3-4.

²"Endymion," Book IV, l. 487.

³"Endymion," Book I, l. 363.

"Song of Four Faeries," ll. 51-53.

⁴Frequencies for the references are given in parentheses: clouds (6), comets (1), dizzy void (1), earth (1), ether (5), firmament (2), globe (1), heavens (2), meteors (4), orb (2), planet (11), polar ray (1), sky (4), space (2), spheres (9), sun (11), universe (6), zenith (2).

⁵"To one who has been long in city pent," ll. 13-14.

⁶King Stephen, I, i, 18.

familiar with the terms of astronomical science; as for example, the following passage which speaks of a "firmament" surrounded by a space-filling "element":

A firmament reflected in a sea;
An element filling the space between;
An unknown--but no more.¹

The irrevocable regularity with which the constellations revolve in their fixed courses is suggested in the following lines:

"Moan, brethren, moan; for lo, the rebel spheres
"Spin round, the stars their ancient courses keep,
"Clouds still with shadowy moisture haunt the earth,
"Still suck their fill of light from sun and moon."²

Besides suggesting the regularity with which the planets revolve, the lines quoted below suggest the immensity of the planetary systems:

Huge as a planet, and like that roll round,
Eternally, around a dizzy void?³

In contradistinction to the lines quoted above, the following reference indicates the author's consciousness of order even in the infinitesimal structural units of the universe:

"'Hast sifted well the atom universe."⁴

A reference to the possibility of there being no death in the universe, spoken by the overthrown god, Saturn, is hardly substantial proof that Keats believed physical death is merely a

¹"Endymion," Book I, ll. 300-302.

²"The Fall of Hyperion," Canto I, ll. 418-421.

³"Sleep and Poetry," ll. 176-177.

⁴"Hyperion," Book II, l. 183.

transmutation to another form of life, but the line does suggest the vital, living aspects of every part of the universe:

"There is no death in all the universe."¹

There is a particularly significant passage, reminding one of the modern Hardy, which refers to the comparative unimportance of the earth in the huge solar system, and which indirectly suggests man's insignificance:

This little ball of earth, and chuck it them
To play with.²

There are passages in Keats which, though they do not mention purely scientific information, suggest the attitude of the scientist. For instance, one passage, famous in the annals of poetry, discusses the emotion aroused in the astronomer as he discovers a new planet. The joy of discovery is keenly felt by the scientist. In the following reference, Keats creates an analogy between this emotion and his own feeling when he first read Chapman's Homer:

Then felt I like some watcher of the skies
When a new planet swims into his ken.³

II. References to Chemistry, Physics, and Geology

At the time Keats wrote, the phlogiston theory had been displaced and the atomic theory of matter advanced. In 1774 Priestly had discovered the element oxygen; and Lavoisier had

¹"The Fall of Hyperion," Canto I, l. 423.

²Otho the Great, III, ii, 23.

³"On First Looking Into Chapman's Homer," ll. 9-10.

come along shortly afterward to prove that this element, oxygen, and not the mysterious substance, phlogiston, was responsible for combustion. Dr. F. J. Moore says,

This Chemical Revolution inverted the chemical point of view. The mysterious substance phlogiston, which does not obey the law of gravitation and which changed its properties arbitrarily as theoretical considerations dictated, was banished from the science and the law of conservation of mass was vindicated once and for all. This made possible qualitative analysis and the chemical equation.¹

The atomic theory of matter was suggested in 1776 by Bryan Higgins who said that two kinds of atoms combine to form particles of a compound. William Higgins, in 1789, stated a theory of combinations between atoms in multiple proportions, the simplest and the most stable combination occurring when two atoms A and B combine to form a binary compound AB. Later Dalton adopted this statement and worked it into his atomic theory. At the beginning of the nineteenth century, there was still serious doubt concerning the atomic character of matter. Since quantitative data was lacking, the principle of the definite composition of compounds and that of constant combining proportions were not acknowledged as valid by everyone. Neither was the law of multiple proportions definitely established. It remained for John Dalton (1808), however, definitely to establish the law and to provide a theory that would allow the science to develop along strictly quantitative lines.

Herman T. Briscoe says further of the atomic theory advanced by Dalton, that most of it can be summarized by the

¹F. J. Moore, A History of Chemistry (New York: McGraw-Hill Co., 1918), p. 50.

following statements: (1) Atoms are the smallest divisions of an element. (2) These atoms are indivisible, compact units of matter. It was not thought in Dalton's day that they possess a structure. (3) Atoms of different elements have different masses, volumes, and forms. (4) Atoms of elements combine to form the "atoms" of compound substances. Such combinations occur in accordance with the laws of definite and multiple proportions. (5) The simplest and most stable compound that two kinds of atoms combine to produce is a binary compound.¹ It was the phlogiston theory and the atomic theory which definitely put an end to alchemy and which marked the dawn of modern chemistry. It is difficult to realize just what a tremendous thing Dalton's atomic theory must have seemed to his contemporaries. Though references to atoms in modern poetry would not be of great significance, in Keats their presence indicates that he was conscious of the scientific thought of his time. About a decade after Dalton announced his famous atomic theory, we find the poet singing:

"Hast sifted well the atom universe."²

Again, Keats refers to the structural unit of matter in the lines following:

Intrigue with the specious chaos, and dispart
Its most ambiguous atoms with sure art.³

There is possibility that the poet's imagination may have

¹See Herman T. Briscoe, The Structure and Properties of Matter (1st ed.; New York: McGraw-Hill Book Co., 1935), p. 18.

²"Hyperion," Book II, l. 183.

³"Lamia," l. 196.

been running ahead of the scientists of his day in presuming an even smaller unit of matter in the line below:

"Withhold no atom's atom or I die."¹

Three other references to atoms use the term simply in its sense of a structural unit.

An interesting reference to the action of the element sulphur, when water is being poured on it while burning, is an indication of his interest in chemistry:

"As fire with air loud warring when rain-floods
Drown both, and press them both against earth's face,
Where, finding sulphur, a quadruple wrath
Unhinges the poor world...."²

The element phosphorous is also mentioned, though in a conventionally poetic manner³; and another element, nitrogen, which has not appeared often in poetry, is spoken of as "grains of Paradise."⁴ In the same two references, both the alloy, brass, and metals in general are mentioned twice.⁵

"Solution" is another term which is usually associated with chemistry; yet we find the poet using the term in a highly imaginative passage:

Into her dream he melted, as the rose
Blendeth its odour with the violet,--
Solution sweet: meantime the frost-wind blows.⁶

¹"Sonnet To Fanny," l. 9.

²"Hyperion," Book II, ll. 144-147.

³"Lamia," Part I, l. 380.

⁴"The Cap and Bells," XXXIII, ll. 6-7.

⁵"Hyperion," Book I, l. 189, "The Fall of Hyperion," Canto II, l. 33.

⁶"The Eve of St. Agnes," XXXVI, ll. 5-7.

The references concerning distillation are definite indications of the poet's familiarity with chemistry, because the term "distillation" is rarely used except in connection with chemistry. In the following line, the poet conceives the bough of a willow tree as distilling the liquid, dew:

"A willow-bough, distilling odorous dew."¹

Such terms as beaker,² flaggon,³ draught,⁴ and phial⁵ suggest the early nineteenth century apothecary, as does the following line concerning a "recipe" for "philtres":

"Ask you for her recipe for love philtres."⁶

Since Keats was licensed to practice as an apothecary, these terms seem to indicate his use of material which he knew at first hand. His mention of poisonous herbs and drugs also suggests the apothecary, who, during Keats's time, was more interested in herbs than chemicals; for example, the poet speaks of a poisonous herb called "wolf's bane":

"Wolf's-bane, tight-rooted, for its poisonous wine,"⁷
of the rich juice in "poison-flowers,"⁸ and of the poisonous

¹"Endymion," Book II, l. 424.

²"Ode to a Nightingale," II, l. 5.

³"The Eve of St. Agnes," XLI, l. 4.

⁴"Ode to a Nightingale," II, ll. 1-2.

⁵Otho the Great, I, iii, 50, "Endymion", Book III, l. 1. 515.

⁶Otho the Great, III, ii, 15.

⁷"Ode on Melancholy," I, l. 2.

⁸"Isabella," XIII, l. 8.

hemlock, which has interested poets for a long time:

"My sense, as though of hemlock I had drunk."¹

Of the drug, opium, obtained from poppies, which has also interested poets for a long time, he speaks four times. A "fierce potion,"² a "domineering potion,"³ and a "drowsy Morphean amulet."⁴ are each mentioned once. A general, though direct, mention of a drug is cited below:

"But put therein some drug, designed."⁵

Besides discussing poisonous herbs and drugs, Keats mentions venom eight times and poison in general ten times, further suggesting the apothecary.

Though discoveries in physics, particularly in the field of electricity, during and just before Keats's time, had been numerous and significant, the investigator has been able to find little trace of them in the poet's works. Since sufficient evidence has already been given in this work to prove Keats's interest in all streams of thought, it is strange that he should neglect the science of physics. Yet, with one exception, he does not suggest a topic related to the physics of his day, a time not very long after Volta had given a tremendous impetus to electricity by constructing the first "voltaic pile," an arrangement for producing a current of

¹"Ode to a Nightingale," I, ll. 2-4.

²"Isabella," XXXIV, l. 3.

³"The Fall of Hyperion," Canto I, l. 52-53.

⁴"The Eve of St. Agnes," XXIX, l. 5.

⁵"Fill for Me a Brimming Bowl," l. 3.

electricity, the first of its kind. Though the existence of the voltaic cell is known by every modern school boy, in Keats's time, it must have created much discussion. His one line concerning physics does mention electricity by using the term "electral," indicating that he was not totally uninterested in the science:

"With an electral changing misery."¹

In comparison with biology, modern geology is a young science. Not until the late eighteenth century and the early nineteenth century did scientists begin to study the reciprocal age of the different rock strata, in this way constructing a history of the evolution of the earth's surface. Keats, too, was interested in geology, possibly because he had studied the science while he was attending Clarke's school;² or he may have been interested in the science chiefly because of its connection with the study of fossils. Whatever the source of the poet's interest, he mentions such aspects as veins of metal:

"Lock'd up like veins of metal, crampt and screw'd,"³
veins of sulphur:

"A vein of Sulphur--go dear Red-Crag, go,"⁴
ribs of rock:

"Lay by him, and a shatter'd rib of rock,"⁵

¹"The Fall of Hyperion," Canto I, ll. 245.

²See page ten of this work.

³"Hyperion," Book II, l. 25.

⁴"Ben Nevis," l. 49.

⁵"Hyperion," Book II, l. 42.

ore, containing gold:

A grain of gold upon a mountain's side,
And twing'd with avarice strain'd out my eyes
To search its sullen entrails rich with ore,¹

and earthquakes, simply stating the term:

"Drown'd wast thou till an earthquake made thee steep,"²

and giving a graphic picture of an erupting mountain:

Of darkness, a great mountain (strange to speak),
Spitting, from forth its peak,
A fan-shap'd burst of blood-red, arrowy fire,
Turban'd with smoke, which still away did reek,
Solid and black from that eternal pyre.³

III. The Pseudo-Sciences: Palmistry, Astrology, and Alchemy

The early nineteenth century was an age of trail blazers in science, and of preparation for trail blazers. At the same time, however, there were several pseudo-sciences which were reminiscent of an earlier state of development. Astrology, for example, the science based on the supposition that the stars are the rulers of human destinies, was still respected by many intelligent people. Whether Keats believed or disbelieved such a theory, the research worker is unable to discover through a study of his works. The context in which references to the science occur lead the reader to believe that the poet did not place much faith in astrology. Yet the very fact that the references occur indicates that he was impressed by its mystery.

¹"The Fall of Hyperion," Canto I, ll. 271-274.

²"To Ailsa Rock," l. 13.

³"The Cap and Bells," LXXIV, ll. 4-8.

The lines following are an example of his interest:

But ever and anon the glancing spheres,
 Circles, and arcs, and broad-belted colure,
 Glow'd through, and wrought upon the muffling dark
 Sweet-shaped lightnings from the nadir deep
 Up to the Zenith, hieroglyphics old
 Which sages and keen-eyed astrologers
 Then living on the earth, with labouring thought
 Won from the gaze of many centuries.¹

Other references mention the Zodiac,² an astrologer's quill,³ the "ministring stars,"⁴ "my life's star,"⁵ the "dooming stars,"⁶ "mortal star,"⁷ and "gemini,"⁸ one of the signs in the Zodiac governing the lives of people born in June.

Palmistry, the science dealing with the lines formed by the friction ridges of the palm of the hand, is mentioned only one time. But this one reference indicates that Keats was aware of the pseudo-science. The line following is somewhat disparaging in tone, but there is no definite information concerning Keats's opinion of palmistry:

"Whate'er your palmistry may take of it."⁹

The reference to alchemy is significant in that it indicates the fact that Keats knew something of the romantic

¹"Hyperion," Book I, ll. 273-280.

²"Lines on the Mermaid Tavern," l. 21, "The Cap and Bells," XXXIII, l. 9.

³"Lines on the Mermaid Tavern," l. 14.

⁴"Endymion," Book III, l. 50.

⁵Otho the Great, II, i, 34.

⁶"Endymion," Book II, l. 864.

⁷"Endymion," Book I, l. 359.

⁸"Ben Nevis," l. 30.

⁹"The Cap and Bells," XXXVII, l. 7.

story of the pseudo-science which gradually evolved into the modern science, chemistry. The alchemists of the middle ages were regarded partly as diligent searchers for truth and partly as workers of dark magic. In its aims, alchemy was confined to two purposes: to discover the means of indefinitely prolonging human life and to transmute the baser metals into gold and silver. The general solvent, or menstruum universale, was to possess, at the same time, the power to prolong life indefinitely. Keats mentions the elixir vitae, or "water of life," which had been one of the chief concerns of the alchemists, in the lines following:

"And as for aqua vitae--there's a mess!"¹

From the facts discussed in this chapter, one sees not only that Keats was interested in the biological sciences, but that he had^a certain^a amount of knowledge concerning astronomy, chemistry, physics, geology, and the pseudo-sciences. His attitude toward the pseudo-sciences, of course, is slightly scoffing. Besides being interested in these branches of knowledge, Keats was concerned with the effects that scientific methods and scientific findings were having upon religion and philosophy.

¹"The Cap and Bells," XXXIII, l. 3.

CHAPTER V

CONCLUSION

The style of Keats has been variously described as "pretty," "sensuous," "exotic," and "romantic," not without some basis of justice, perhaps. But like most descriptive terms, these words fail to suggest the quality of the poet's style in its entirety, for, as Professor Richard F. Jones says:

Literary style, like human personality, is a compound exceedingly difficult of analysis, for when its more obvious constituents are made clear, there still remains an illusive element, consciousness of which leaves the analyst with the unpleasant sensation of not having reached the bottom of the matter.¹

It is for this reason that the investigator wishes to point out certain elements in the style of Keats, which, though they are not its distinguishing characteristics, contribute to the impression made upon the reader by the whole. In this connection, the study of Keats's poetry recorded in Chapter III, which deals with physiology and anatomy, was made.

It is not difficult to find an authority for those critics who hold that Keats is a sensuous poet. One has only to read "Endymion" to be convinced that he does emphasize the aspects of sensation. In this poem, he appears to be interested chiefly in living life to the full, in a physical, hedonistic portrayal. He was at home in the renaissance philosophy. To him, as to the poets whom he revered, the world was a gift for

¹EMIA. Richard F. Jones, "Science and English Prose Style in the Third Quarter of the Seventeenth Century," Vol. 45 (December, 1930), p. 977.

man to use and enjoy. Though scholars have written much concerning the allegory of the poem, "Endymion," the impression made upon the general reader is still primarily that of a poem written to appeal to the senses. This latter point will be discussed later. The explanation of its effectiveness is of concern now. Since the author does write from a sensuous point of view, in the early poems, at least, it is interesting to search for the methods which he employed. Chapter II brought out the fact that his poems are highly colored by physiological terms. This quality distinguishes the author throughout his work. In the third chapter, it was further brought out that such an effect was created through the use of specific terms, or terms indicating specific information. It was also shown, in this chapter, that these specific terms and this information Keats gained from a careful study of anatomy and physiology.

In several other respects, Keats is indebted to his knowledge of biological science, particularly to his medical knowledge. The second chapter has discussed the manner in which such information is reflected in his poetry. The final effect upon the reader of this general medical information is unlike that produced by the anatomical and physiological references. For, though, to a certain extent it adds to the characteristic general tone of his poetry, it also is more specific, coloring particular passages. Besides being indebted to his medical information to the extent that he borrowed from it for his poetry, Keats is also indebted to medical

science for the experiences which he had during his period of training. These experiences either find their way into his poetry, or the impressions which they made upon him are evident. In this latter connection, his consciousness of physical suffering, and his frequent references to health and healing are cited as proof.

The student of Keats notices also the poet's dependence on general biological knowledge. Besides drawing on his information concerning those branches of scientific knowledge concerned with medicine, he employs his knowledge of fauna and flora, for instance. The ideas which he has distilled from his biological studies are of significance in his philosophy. Like Locy, he regards biology as a stream of thought, a part of the history of human development. His conceptions of nature, discussed in Chapter I, emphasizes the theory that man is limited by nature's laws, and that an attempt to disregard them is fatal. His own conflict with the laws of nature came in his tendency to let his imagination run riot, unrestrained by the reasoning faculties which nature gives us:

Or is it that imagination brought
Beyond its proper bound, yet still confin'd,
Last in a sort of Purgatory blind,
Cannot refer to any standard law
Of either earth or heaven? It is a flaw
In happiness, to see beyond our bourn,--
It forces us in summer skies to mourn,
It spoils the singing of the Nightingale.¹

The most significant aspect of his biological views, however,

¹"Epistle to John Hamilton Reynolds," ll. 78-85.

is that concerned with man's evolution. The evidence found in this connection is especially interesting in view of the fact that the evolutionary theory was not widely accepted until after the middle of the nineteenth century. He speaks of man in connection with the apes, thus suggesting physical evolution; he mentions the changing, or developing, thoughts of man;

Hither and thither all the changing thoughts
Of man; though no great minist'ring reason sorts
Out the dark mysteries of human souls
To clear conceiving: Yet there ever rolls
A vast idea before me, and I glean
Therefrom my liberty; thence too I've seen
The end and aim of Poesy. 'Tis clear.¹

and he suggests evolutionary religion in the "Sonnet Written in Disgust of Vulgar Superstition," quoted at the beginning of Chapter IV.

Perhaps the fact that his nervous organization was extremely delicate and sensitive led Keats to trust completely the imagination and intuition. Pure feeling and imagination, he thought, can come nearer real truth than the intellect. He speaks of the imagination thus:

I have never yet been able to perceive how anything can be known for truth by consecutive reasoning--and yet it must be. Can it be that even the greatest Philosopher ever arrived at his Goal without putting aside numerous objections? However it may be, O for a life of Sensations rather than of thoughts!²

In the spring and winter of 1817-1818 there occurred

¹"Sleep and Poetry," ll. 287-293.

²Keats's letter to Bailey, November 22, 1817. Quoted by Ernest de Selincourt, The Poems of John Keats (New York: Dodd Mead and Company, 1905), p. xxxviii.

a revolution in the thinking of the poet.¹ He then emphasized his need for knowledge and philosophy, stating in a letter to John Taylor: "I mean to follow Solomon's directions, 'Get learning--get understanding.'"² From this time on, his poetry begins to improve until he reaches his height in the famous odes. These later poems, in contradistinction to the sensuous "Endymion," are based on something more substantial than mere emotion and sensations. Keats now realizes the necessity for both knowledge and experience as the bases for poetry and expresses the idea thus:

The difference of Sensations with and without knowledge appears to me this: in the latter case we are falling continually ten thousand fathoms deep and being blown up again, without wings, and with all the horror of a bare-shouldered creature--in the former case, our shoulders are fledge, and we go through the same air and space without fear.³

This respect for knowledge took concrete form in his poetry and is illustrated in this thesis by many passages in which the poet drew heavily from his experience and from his scientific knowledge. With this as the basis for his imaginative powers, Keats reaches his greatest powers in the odes.

Although Keats wanted to reach the attitude of the scientist, objectivity, in his poetry, he could never quite accomplish this state. Whether he missed his goal because of his too-intense nature and inability to arrive at the scientist's detachment, it cannot be known. Perhaps if he had been

¹Thorpe, op. cit., p. 65.

²Ibid., p. 66.

³Ibid., p. 70.

physically stronger and if he had not been so near poverty as he was, he might have achieved even greater poetry. That, however, is a matter of conjecture. Undoubtedly the beauty of his last poems owes much not only to the fact that he introduced his knowledge and his experiences into them, but also to the fact that he had achieved a small measure of detachment when he wrote them, getting away from an excess of sensations. Thus, in thought as well as phrase, Keats shows himself responsive to the scientific movements of his age.

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