SCIENCE IN BRITISH POETRY
from
1910 to 1925
A Study in Diction
by
Rhoda Ensign
A.B. 1925, University of Kansas

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Approved by:

[Signatures]

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Head of Department
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Walter Pater, in his essay on *Style*, suggests that, as English for a quarter of a century had been assimilating the phraseology of pictorial art and for half a century that of German metaphysics, "for many years to come its enterprise may well lie in the naturalization of science." 1

It is the purpose of this study to test to what degree such naturalization has taken place in modern British poetry. Scientific theories and facts which have noticeably influenced the thought and philosophy of contemporary poets are excluded from consideration, except as they include direct reference to particular sciences. The *Man With the Hoe* by Edwin Markham, the American poet, for instance, is clearly related in

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1 Pater's *Appreciations*, p. 12
thought to modern sociology, yet no specific terms from this science, such as "mores," "maladjusted," or "social degeneration" are mentioned, nor is there any reference to a sociological theory such as Malthus's theory of overpopulation. Sociology and, to some extent, psychology have not yet evolved very definite terminologies, so that their influence appears more in the poet's general attitude than in particular references. The relation of science to poetic diction may be shown by the poet's choosing scientific terms in lieu of popular names, by his alluding to a scientific fact or concept, or by his employing figures of speech borrowed from science. Occasionally, we find a poem like Tennyson's By an Evolutionist in which the thought depends entirely upon subject matter drawn from science.

Whatever findings result from this study are to be examined partly with respect to the writers' scientific background, but chiefly in the light of their bearing upon various theories regarding poetic diction. The conclusions should show how far Pater's suggestions about naturalizing scientific
terms has been met in modern British poetry.

For the purpose of this study since more or less arbitrary time limits had to be set, a period of about fifteen years, approximately from 1910 to 1925, was chosen. It is evident that these dates cannot be absolute, since a collection of undated poems, appearing in 1915, for instance, may include poems written before 1910. The year 1910 is a convenient date, for a new movement in British poetry is marked by the publication of Masefield's *The Everlasting Mercy* in 1911, and the appearance of the first *Georgian Anthology* the following year. To mark the beginning of the modern period in science did not prove feasible, primarily because so many early concepts are still accepted, and because discoveries and dissemination of knowledge about them are frequently far removed and variable in time. In as much as the enormous strides made in science during the nineteenth and twentieth centuries have resulted in a body of knowledge so great and so important in modern
thinking we should expect it to have some noticeable effect upon modern poets.

Obviously, not all poems published between 1910 and 1925 could be studied; therefore, after several anthologies had been examined, those poets whose work promised to yield valuable material were further investigated. Wherever possible, their collected poems and other publications were secured. Anthologies available were Untermeyer's Modern British Poetry, both the 1920 and the revised edition, five volumes of Georgian Poetry, from 1912 to 1920, and the 1918, 1919, and 1920 editions of Wheels, edited by Edith Sitwell. Two anthologies which appeared after 1925, Sanders and Nelson's Chief Modern Poets of England and America and Drinkwater, Canby, and Benet's Twentieth Century Poets, were also examined. Any significant material, whether found in anthologies or publications of individual poets, has been used.

With the exception of the Sitwells and their associates, no clearly defined schools are repre-
sented among the poets considered here, although many belong to the rather loosely bound group known as "The Georgians." This includes writers whose poems have appeared in the various Georgian Anthologies, among them John Masefield, Robert Graves, John Drinkwater, J.C. Squire, Rupert Brooke, Harold Monro, W.J. Turner, and Robert Nichols. One extremely well known poet, Alfred Noyes, who has published a book especially significant in this study, is not identified, even vaguely, with "The Georgians."

The three Sitwells—Edith, Osbert, Sacheverel—together with others who have written for the anthology Wheels, comprise a distinct school, albeit a minor one. Since no other collections representing members of this group could be secured, except a few small volumes by Edith and Osbert Sitwell, their contributions must be judged only by samplings offered in Wheels. Aldous Huxley, grandson of the famous scientist, Wilfred Owen, Iris Tree, Sherard Vines, and Geoffrey Cockson belong to the Sitwell school.

To say that the poets who have been selected
for individual consideration are altogether repre-
sentative of modern British poetry, or that the
field has been completely or satisfactorily covered,
would obviously be claiming too much. Nevertheless,
the group does show certain tendencies toward adopt-
ing scientific terminology for poetic use, and it
includes several major figures in contemporary
poetry. Likewise it is significant that all the
poets so far mentioned with the exception of minor
writers in the Sitwell group, appear in Untermeyer's
anthology, and five are found among the fifteen
British poets included in the Sanders and Nelson
collection, two of the fifteen being here excluded
as belonging to a period earlier than 1910.

Before we turn our attention further to science
in present day poetry, we shall find it profitable
to make a brief survey of modern scientific progress,
particularly in the last two centuries, and to make
a preliminary study of certain earlier poems which
strikingly illustrate how science has been utilized.

Against the background of what has been done
or attempted in science as well as in poetry, the
modern poet's interest or lack of interest with regard to utilizing science is better understood.

The Renaissance, by quickening intellectual interests also gave life to experimental science. The fifteenth, sixteenth, and seventeenth centuries produced astronomers like Copernicus, Tycho Brahe, Kepler, Newton, and Halley. Physical sciences made great advance, particularly with the introduction in the seventeenth century of the telescope, thermometer, barometer, microscope, and air-pump. Natural sciences also developed rapidly after Harvey's discoveries of the circulation of blood and beginnings of life in the egg. Vesalius in the sixteenth century became "the founder of modern anatomy." In the next century important observations in anatomy, medicine, and physiology were made by microscopists, particularly Leeuwenhoek. In 1662 was founded one of the greatest societies for the advancement of natural science, the Royal Society.

Foundations in experimental sciences had been

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1 New Lartned History, V. IX, pp. 7567-7570.
laid in the seventeenth and eighteenth centuries, but the nineteenth century witnessed an unprecedented enthusiasm for research. It was, indeed, "the wonderful century," filled with amazing discoveries and theories. A most striking feature of this progress has been the wide dissemination of scientific knowledge among laymen as well as among savants. The eagerness with which the public now welcomes news of scientific discoveries finds no counterpart in the days when the Inquisition persecuted the aged Galileo for daring to affirm that the earth moved about the sun. What once belonged to the learned exclusively has now, so far as that is possible, become common property, thanks in some measure to the nineteenth century crusaders.

No other nineteenth century theory has attracted greater interest than that of organic evolution as set forth by Charles Darwin in 1859, although many concepts which he popularized were current earlier in the century. Lamark had already submitted the idea that animals were transformed through adaptation to environment, and, as early as 1830-33 Sir
Charles Lyell had in his revolutionary *Principles of Geology* insisted that the earth had been formed through a uniform and continuous process. Darwin's *Origin of Species* and *Descent of Man*, by applying Lyell's theory to living objects, aroused great religious intolerance and controversy, but no Inquisition, as in Galileo's day, suppressed them. Through the disputes of those who denounced and those who defended, knowledge of the evolutionary theory spread far and wide. It stirred the world's imagination, strongly affecting thought and philosophy. Decided impetus was thus given to the study of science, particularly of biology and geology. Scientists unearthed records of prehistoric life and man's early development, adding to and modifying Darwin's hypothesis. New biological sciences developed rapidly at the close of the century,--psychology, embryology, bio-chemistry, and bacteriology. Much was learned about methods of controlling disease, early stages in the development of life, chemical reactions within cells, nervous activity,
and the importance of glands.

In chemistry and physics the atomic theory was further developed, leading to very important practical and commercial applications. In 1895 Rontgen discovered the rays that received his name; a year later Becquerel observed the radio-active properties of uranium; and in 1898 M. and Mme. Curie succeeded in isolating radium.

Astronomy, in which striking progress had been made since the early sixteenth century, greatly widened its horizons, aided by the invention of the spectroscope and photographic telescope, which revealed celestial wonders far exceeding man's imagination. "Hundreds of millions of stars have been photographed; and the boundaries of the stellar universe have been pushed into space, but have not been attained."

Scientific zeal has not abated in the twentieth century, but has followed the lines of development already indicated. Fields of research are so many and investigators so numerous that discoveries

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multiply unceasingly and are almost immediately brought to the attention of the public through newspapers, magazines, and books, both technical and popular. By far the most revolutionary hypothesis advanced has been Einstein's theory of relativity, a term widely known but little understood among laymen. Its acceptance by physicists has been general, except as an explanation of electro-magnetic forces. Einstein considers Newton's laws of gravitation to be statements of illusion, for the apparent attraction exerted by an object is due to acceleration of the object which it seemingly attracts. Furthermore, according to Einstein, time is a kind of "fourth dimension," but both time and space are subjective terms and they exist only in relation to each other.

By being constantly exposed to scientific ideas, the public has absorbed much information, however superficial, and has maintained its enthusiasm for the advancement of science. Both
literary and colloquial vocabularies have been enlarged with words like electron, neurone, uranium, amoeba, and bacteria. To what extent such terms and ideas like Einstein's theory or Newton's laws have entered modern poetry will be discussed later. Before considering science among contemporary poets, let us turn back in time and knowledge that we may examine some notable illustrations of how poets have utilized science in their work. While not sufficiently complete to afford a true historical background, such a survey, by showing some important tendencies among earlier poets, suggests interesting comparison with the poetry of today.

A century before our Christian era began, the Roman poet Lucretius was born, a poet who has been compared with Milton, not only in his aim, but also in his achievement. His fame rests upon the six books of De Rerum Natura, a philosophic work encompassing the Greek and Roman world of science as interpreted by the atomic
theory of Democritus of Abdera. Its purpose, clearly didactic, was high—to explain the nature of things that people might be released "from the fast bonds of religious scruples."

In carrying out this avowed purpose, Lucretius set forth his scientific knowledge, showing its application to human conduct. Declaring that substance is eternal since nothing comes from nothing and that matter consists of constantly changing and recombining atoms, he concludes that there is no life after the grave; hence fear of death is folly. In the fourth book he explains sense perceptions and dreams. The next book has a wider scope, including theories of astronomy, creation, biology, and the beginnings of civilization; he here denies evidence of divine direction. In the last book he assigns natural causes to phenomena such as thunder, earthquakes, and volcanoes.

As a document of scientific, social and scientific history, De Rerum Natura is valuable. It is equally noteworthy for its poetic merit.

Quoted in Munro's T. Lucreti Cari, p. 22
Lucretius succeeds highly where many have failed, in making a body of scientific knowledge serve as a medium for imaginative interpretation. The form, the diction, the music of De Rerum Natura are all poetic.

Lucretius seeks to explain the mysteries of creation in order that he may remove man’s fear; Milton chooses to describe them in order "to justify the ways of God to men." He does not by any means build his philosophy entirely upon scientific theory as does Lucretius, but he makes considerable use of astronomy in parts of Paradise Lost. The seventh book, as the scientist Huxley points out in Three Hypotheses Respecting the History of Nature, assumes that the universe came into being at a time not greatly removed from the present, in a definite order beginning with light and ending with the creation of man. Milton here follows the Biblical account; the advice given Adam in Book IV reveals his attitude (adapted for the purpose of the poem) toward scientific theory

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1 Rogers's Voice of Science in Nineteenth Century Literature, pp. 54-55.
in conflict with religious dogma. Included within this passage we find a beautiful figure of the rotation of the earth, a fact to which contemporary poets commonly refer:

Whether the sun predominant in heav'n
Rise on the earth, or earth rise on the sun,
He from the east his flaming road begin,
Or she from west her silent course advance
With inoffensive pace, that spinning sleeps
On her soft axle..............................

Solicit not thy thoughts with matters hid, I
Leave them to God above; Him serve and fear.

Milton's knowledge of current astronomical concepts is evidenced here, for he refers to the dispute during his lifetime concerning the Ptolemaic assumption that earth was the center of the universe and the Copernican theory that the sun was the center. He shows familiarity with terms used in both hypotheses, such as the Ptolemaic "centric," "eccentric," "cycle," and "epicycle" and the Copernican "diurnal.

By alluding to the heliocentric concept and to his visit to Galileo in Italy, Milton shows that, not through ignorance but from choice, he employed the

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1 Milton's Poems, p. 193
Ptolemaic theory. Moreover, he uses the still more ancient Pythagorean idea of the music of the spheres. *Paradise Lost* is certainly no less poetic because Milton chose the older cosmology.

If we except his account of creation as being more Biblical than scientific, we find that, unlike Lucretius, Milton uses scientific knowledge chiefly as incidental to his philosophy, not as a necessary vehicle for it. More interesting than direct references, however, are the occasional figures of speech drawn from astronomy to describe things not scientific. Thus the poet compares, in Book III of *Paradise Lost*, the place where Satan alighted to

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. . . . . . a spot like which perhaps
Astronomers in the sun's lucent orb
Through his glazed optic tube yet never saw. 1
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As a matter of terminology, we may note that the word "telescope" has now replaced the earlier "optic tube." A reference to "optic glass" occurs in the well-known description in Book I of Satan's shield, where Milton mentions his visit to Galileo. Here astronomy enters into a Homeric simile:

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1 Milton's Poems, p. 78.
. . . . . . the broad circumference
Hung on his shoulders like the moon,
whose orb
Through optic glass the Tuscan artist
views
At ev'ning from the top of Pesole
Or in Valdarno, to descry new lands,
Rivers or mountains on her spotty
globe. 1

Milton, like Lucretius, effectively utilized
scientific assumptions now held to be largely false,
because he was a true poet. In striking contrast
to him is Erasmus Darwin, the grandfather of Charles
Darwin. During the late eighteenth century the
ever Darwin was acknowledged as both scientist and
poet. His ambition exceeded his powers, and possibly
his judgment, for he wished to make popular the study
of botany through a poetic treatment of the science.
His purpose, as he says in the "Advertisement" to
the poems, Economy of Vegetation and Loves of the
Plants is "to enlist imagination under the banner
of Science . . . While their particular design is
to induce the ingenious to cultivate the knowledge
of Botany by introducing to the vestibule of that
delightful science, and recommending to their
attention the immortal works of the celebrated

1 Milton's Poems, p. 10.
Swedish naturalist, Linnaeus.

Although these poems were widely read and translated into other languages, Darwin's attempt to carry out his purpose provides the modern reader with more entertainment than instruction. In his ornate and highly conceited descriptions of plant life flowers have the features of human beings; they suffer the same emotions, even to falling in love. These flowery romances are often more ingeniously than convincingly conceived. Canning's Loves of the Triangles cleverly satirizes Darwin's efforts. The passage quoted below well suffices to show some of the most unpoeitic qualities resulting from the attempt to combine botany and poetry. Darwin is here describing the Collinsonia, a flower containing two stamens and one pistil:

Two brother swains of Collin's gentle name,
The same their features, and their forms the same,
With rival love for fair Collinia sigh,
Knit the dark brow, and roll the unsteady eye.
With sweet concern the pitying beauty mourns,
And soothes with smiles the jealous pair by turns.

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1 Milton's Poems, p. 10  
2 Darwin's Poetical Works, Vol. I, pp. iii-iv
Neither science nor poetry is satisfactorily served in such elaborate conceits, which require explanatory notes for mere intelligibility. Failure to achieve, however, may be as significant as success. So we might point out that Darwin's failure was not due to his use of science for poetic purpose but to his want of poetic genius. Above all, he lacked imagination, though fancy he had in abundance.

The great poet-prophet of "the wonderful century" in scientific achievement is Tennyson, whose poems record how alert he was to great changes wrought by the new discoveries and theories. As a young man he had been one of a college group seething with political, social, and scientific ideas. Later, while in retirement at Somersby, he undertook the study of science. *Locksley Hall* reveals the fervor with which the young Tennyson absorbed "the fairy tales of science and the long result of time."

Theories concerning the nature of the heavenly bodies, the creation of the world, and evolution of life profoundly influenced his mental outlook, an outlook that changed, to be sure, as the years passed and
and the poet realized how inadequate was science alone to right the world's wrongs. Tennyson's poems contain a wealth of allusion and figures drawn from astronomy, geology, and biology.

In four different poems Tennyson refers to the concept ascribed to Buffon that six distinct periods occurred in the creation of the earth. In Two Voices he states the theory simply,

When first the world began,
Young Nature through five cycles ran,
And in the sixth she molded man. 1

In Memoriam contains a similar reference, with particular mention of Laplace's nebular hypothesis as the earth beginning "in tracts of fluent heat." 2 Laplace assumed that our universe was once a glowing, rotating, gaseous nebula that, in cooling, gave rise to equatorial rings which later disrupted and combined into planets. This theory is developed in The Princess:

This world was once a fluid haze of light,
Till toward the center set the starry tides,
And eddied into suns, that wheeling cast 3
The planets; then, the monster, then the man.

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1 Tennyson's Poems, p. 33
2 Tennyson's Poems, p. 513
3 Tennyson's Poems, p. 386
As a figure of speech the newer geologic conception of creation appears in Confessions of a Second Rate Sensitive Mind:

Truth may stand forth unmoved of change, as from the storm
Of running fires and fluid range
Of lawless airs, at last stood out
This excellence and solid form
Of constant beauty. 1

Astronomy furnishes Tennyson with many effective figures of speech. He was greatly impressed with the vastness of the universe, with man's insignificance, and with the unchanging law that controls stellar movement. Weary of the confused babble of politics, he asks, "What is it all but a trouble of ants in the gleam of a million million of suns?" 2 He compares the soul that withdrew from life into The Palace of Art to

A star that with the choral starry dance
Join'd not, but stood, and standing saw
The hollow orb of moving circumstance
Roll'd round by one fix'd law. 3

1 Tennyson's Poems, p. 6
2 Tennyson's Poems, p. 65 (Vastness)
3 Tennyson's Poems, p. 53
Astronomical figures may be as simple as the lighting of lamps "which out-burned Canopus" and as the seas of "moon-led waters white." Or they may evidence more knowledge as in these passages:

The Sun flies forward to his brother Sun;
The dark Earth follows wheel'd in her ellipse,
And human beings returning on themselves 3
Move onward, leading up the golden year.

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And while the world runs round and round;
I said,
Reign thou apart, a quiet king,
Still as, while Saturn whirls, his steadfast shade
Sleeps on his luminous ring. 4

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Mother-Age (for mine I knew not) helpe me
as when life begun;
Rift the hills, and roll the waters, flash
the lightnings, weigh the Sun. 5

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1 Tennyson's Poems, p. 64 (Dream of Fair Women)
2 Tennyson's Poems, p. 53 (The Palace of Art)
3 Tennyson's Poems, p. 103 (The Golden Year)
4 Tennyson's Poems, p. 49 (The Palace of Art)
5 Tennyson's Poems, p. 112 (Locksley Hall)
Darwinian influence, so strongly felt in the latter half of the nineteenth century, appears in By an Evolutionist and Locksley Hall Sixty Years After, where the disillusioned Tennyson speaks. Indeed, nine years before the publication of Darwin's *Origin of Species*, the idea that later became known as the Survival of the Fittest was strikingly expressed in the following passage from *In Memoriam*:

Are God and Nature then at strife,  
That Nature lends such evil dreams?  
So careful of the type she seems,  
So careless of the single life;  

That considering everywhere  
Her secret meaning in her deeds  
And finding that of fifty seeds  
She often brings but one to bear,  

I falter where I firmly trod. 1

Through his extensive knowledge of science, particularly of astronomy, and his unhesitating adaptation of it for poetic use, Tennyson pointed the way for the twentieth century poets. Some followed; many turned aside. Incidentally, it is worthy of note that his contemporary, Browning,

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1 Tennyson's *Poems*, p. 115 65.
scarcely touched by the agitation about him, could write a long poem about an early scientist, Paracelsus, yet omit any mention of science.

John Davidson and Francis Thompson--the latter through a single poem--are important links between Tennyson and the poets writing within the period from 1910 to 1925. Since the former died in 1908 and the latter in 1907, some of their poems almost fall within the period of this study. Undoubtedly, they belong to the period as truly as many other poems here considered, poems that are not dated but appear in anthologies or collections published since 1910. While belonging to the nineteenth century in their treatment of science, Davidson and Thompson add many newer concepts not found in Tennyson.

With the exception of the one very significant poem already referred to, Thompson's writings are almost wholly non-scientific in diction, although the poet's father was a doctor and he himself, though reluctantly, had entered a course in medicine. His magnificent Hound of Heaven marks him as a mystic; his Nineteenth Century shows him a student of science.

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The latter poem is a fine review of the achievement and spirit of the past century. Almost half of this long poem describes scientific progress; accomplishments in war, politics, literature, receive less consideration. Science is most curiously symbolized as a blind worm, worshipped beyond its due, yet,

Working dull way by obdurate, slow degrees,
It is a thing of sightless prophecies;
And glories past its own conceit
Attend to crown
Its travail, when the mounded time is meet.

There follows a series of passages praising investigators in many fields, among them those "who learned to rein the chariots of the stars," and those who brought forth,

By their scientific might,
The secret ladder where through all things climb
Upward from the primeval slime. 2

Nor less we praise
Him that with burnished tube betrays
The multitudinous diminutives
Recessed in virtual night

1 Poetry Journal, December, 1912, pp. 14-15
2 Poetry Journal, December, 1912, p. 17
Below the surface seas of sight;
Him whose enchanted window gives
Upon the populated ways
Where the sky universes live
Ambushed beyond the unapprehending gaze.

An enumeration of biological discoveries closes
with an explanation of how the prothallus of the fern
contains both sexes and decays in producing new life.

The dusty anther's glove of spiky stars,
The beetle flashing in his minute mail
Of green and golden scale;
And every water-drop a-sting with
writhing wars.
The unnoted green scale, cleaving to the
moist earth's face
Behold disclosed a conjugal embrace,
And womb--
Submitting to the tomb--
That sprouts its hasty issue; everywhere
conjoins
Either glad sex, and from unguessed-at
loins
Breeds in opulent ease
The liberal earth's increase;
Such Valentine's sweet unsurmised diocese.

We are reminded of Erasmus Darwin's Loves of the
Plants, but this, we submit, is far more poetic than
allusions to stamens that "Knit the dark brow and

1 Poetry Journal, December 1912, p. 17
2 Poetry Journal, December 1912, p. 17

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and roll the unsteady eye." One line, indeed, is unusually suggestive, "And every water-drop a-sting with writhing wars." Here we are aware, as in some of Tennyson's happiest phrases, that the poet has added, through his imaginative touch, to our grasp of truth. To a lesser degree this is true when we read the description of medical progress:

Such triumphs theirs who at the destined term
Described the arrow flying in the day--
The age-long hidden germ--
And threw their prescient shield before its deadly way. 1

John Davidson's creed, "Man is the Universe grown conscious," is a product of evolutionary theory by which he was strongly impressed. Not one, but many of his poems show his deep interest in science. In An Elegy for Queen Elizabeth's Day the origins of earth, animal and plant life, and man, follow a Darwinian, not a Miltonic explanation, thus:

With plasm in throbbing motes,
With moss and ferns and giant beasts unkempt,
He (God) laboured long, until at length he seemed
To breathe out being. 2

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1 Poetry Journal, December 1912, p. 18
2 Davidson's Poems, p. 19
The philosophy asserted so frequently by Davidson has for its medium in Anthropological Theology chemistry and physics, two sciences little mentioned by Tennyson. Man here is "pure material nature;" the shadowy "soul" of the mystic is newly defined in this manner:

... And by your souls
I mean the whole machinery of power,
Vital, emotional, and cerebral,
Transmuted from bisexual energy
Of lightning and the lodestone, from
the force
Expansible of gases, from intense
Alchemical desires, miraculous
Irradiations, metamorphoses;
And from the everlasting passionate
Molecular attraction, pulsing strong
Even in the matter of a mendicant,
With that recondite, interatomic play
Electrons manage in secluded courts
So infinitely small that elfin bowers
Beside them seem the spacious vault of heaven. 1

This passage is strikingly original, and is also interesting because two later poets have used the same idea, though expressing it less forcibly and with fewer references to physical science. Not in the holy bread, continues Davidson, is found the body of God, but rather in chemical elements and

1 Davidson's Poems, p. 119
forces:

It is the sun, the earth, the elements,
Sirius and Aldebaran and Mazzarath,
The ether and the lightning and the light,
The whole illimitable universe,
Carbon and those aerial potentates—
Azote, which men call nitrogen,
Sultan of all the elements, the virile oxygen;
The brilliant vapour of the hottest stars,
The lady of the water; principal Components of the visible Universe,
And the main fibres of infinitude,
Are we, our food, our drink; and every meal
Is eucharist, and every dining room
A temple.

Davidson's philosophy is so firmly rooted in science that, like Lucretius in *De Rerum Natura*, he could not easily have used another medium for its expression. In addition to the passage quoted above, we find other allusions to newer astronomical thought: to nebulae which "evolving constellations, their spindles whirl;" and to the force of electricity and its presence in all matter when, like Lucretius, he finds no "oversoul" in natural phenomena,

Grasp it and hold it in your heart of hearts,
That nothing lies behind, nothing at all,
Except the ether woven from bourne to bourne—
If there be spatial bournes—continually

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1 Davidson's *Poems*, p. 121
2 Davidson's *Poems*, p. 136
Evolving lightning, chrysosperms of space,
Electric lust forever unconsumed,
Twinsed fertility that begets and breeds
The divers elements whereof we are,
And all the suns and all the galaxies. 1

One other long passage, from *Anthropological Theology*, is worth quoting as an illustration of what Tennyson did so well, the utilization of astronomy for figurative purposes. This simile is far more elaborate than any found in Tennyson, though no more effective:

When solar space—
One modest atom of the universe,
Five thousand million of our useless miles
Diametrically measured; when this was still
A-hatching, every time a split-new planet
Burst from the teeming and the spiral sun,
A pang of terror rent the elder orbs,
And every asteroid and comet swerved
Unconsciously dismayed; and so in us
When virginal, momentous deeds are done,
And sudden, awful thoughts in action sphered,
A perturbation palsies intellect,
Maddens the fancy, dislocates the soul,
Imperilling the assembled powers that form
Our being; but when the naked deed had reached
Its orbit and begun to circle, free
In the all-containing ether, our realm in space
Is richer, greater by the new born star. 2

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1 Davidson's Poems, p. 116
2 Davidson's Poems, p. 124
Davidson out-ranks all other recent British poets in the breadth and originality with which he handles modern science. No other one poet has introduced into his verse so many new scientific terms, such as "electron," "molecular attraction," "bisexual energy," and "plasm". Some acquaintance with modern physics, chemistry, and astronomy is necessary before the reader can understand him, even though he writes clearly. While not a star of first or even second magnitude among recent poets, yet he maintains a fairly high level of poetic treatment of his subject matter and philosophy.

We have seen that, from the time of Lucretius to the twentieth century, poetry and science have frequently met on common ground. Numerous examples other than those given could be found, although the poets discussed have provided especially significant material for this study. Astronomy has been the favorite among the poets, yet all the major sciences, and many of their most recently developed branches, have been utilized to some degree. The poets seem
to have kept abreast of their times in scientific knowledge, though Milton chose to employ older astronomical theories. This knowledge has become a part of poetry in several ways. Lucretius and Davidson built their philosophies upon science; Darwin versified botany merely that he might make it a popular study; Thompson wrote in praise of those who devoted their lives to research. All these poets in varying degrees substituted scientific names for common ones, even Darwin whose purpose was to interpret the technical in more familiar terms. In fact, all found it necessary to explain the unknown through older allusions and figures. Aside from becoming a part, large or small, of the subject matter, scientific information appears incidentally in figures of speech. Tennyson showed unusual felicity in making such comparisons, drawing largely upon astronomy. Unquestionably, naturalization of nineteenth century science was well begun before 1910, particularly through Tennyson and Davidson.
When we turn from Tennyson and Davidson to the poets writing between 1910 and 1925, excluding for the present the Sitwell group, which will be discussed later, we are somewhat disappointed at first glance, for we find the poets less enthusiastic about scientific discoveries, less prophetic of their value. No Tennyson arises to champion scientific progress; no Davidson builds his philosophy with evolution, physics, and chemistry. Alfred Noyes, alone, visions on a grand scale the glory of science. As a rule, subjects drawn from other sources engross the attention of the poets during this fifteen year period. The field that seems so barren, however, on closer examination reveals a rather significant incidental use of science by several major twentieth century poets, as well as by many minor writers. Because it is so often incidental, this use is especially noteworthy in the process of naturalizing scientific terms. As casually, often, as

1 Note: Unfortunately, the second volume of Noyes's trilogy, Book of the Earth, was not available for this study.
they allude to historical or to mythological characters, these poets use scientific terms and ideas, assuming the reader to be equally familiar with cell structure, Betelgeuse, stalactites and the Argonauts, Perseus, and Nineveh.

Nothing is more evident in this twentieth century poetry than the persistence of age-old figures from nature and mythology, far outnumbering those from science. Much of the best modern British poetry has an artlessness and freshness that arises partly from a simple, non-bookish diction, with references to sea and rain and flowers and little children. In the hands of a master like Masefield this unpretentious diction becomes a wonderful tool; but when we find less imaginative poets employing figures which have long since lost their suggestive power, we wonder why newer fields for figurative use are not explored. Because many poets--like Masefield, Gibson, Davies, Thomas, the Irish group--have turned toward nature, legend, and lives of humble
people for inspiration, we can account for the
dearth in scientific interest. However, there
exists a large number of the incidental uses
previously mentioned, in addition to several
significant poems, including Noyes's *Watchers
of the Sky*, based upon scientific thought.

Following the tradition of Milton and Tenny-
son, modern poets have shown greatest interest,
not in chemistry, physics, or biology, but in
astronomy. Evolution, no longer hailed as the
key to life's mystery, is rarely mentioned. The
field of chemistry that looked so promising in
Davidson's treatment has not been developed very
much. Biology, occasionally finds a place in
poetry, sometimes as physiology, bio-chemistry,
psychology, and botany, once or twice even as
embryology. Being more closely related to as-
tronomy, geology receives some attention. But,
if they have shown any scientific interest what-
soever, the modern poets have alluded almost
invariably to astronomical ideas, new and old.
Watchers of the Sky, the first volume of Noyes's trilogy, The Torchbearers, dealing with scientific advance, is the most ambitious treatment of astronomy undertaken by a British poet. To find its parallel we must go back to the Phainomena by the Greek poet Aratus, which was, however, more legendary than scientific and dealt with the appearance of the heavens rather than with those who studied astronomy. Watchers of the Sky contains a survey of great astronomers from Copernicus to Sir John Herschel. Its author hoped to arouse appreciation for these scientists and "to show that spiritual values are not diminished or overwhelmed by the 'fifteen hundred universes' that passed in review before the telescope of Herschel." Whereas Lucretius, in a similar treatment of all sciences known to him, hoped to explain away man's belief that gods controlled natural phenomena, Noyes hoped that, by describing stellar vastness and law, he might heighten men's faith in a divine Ruler.

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1 Noyes's Watchers of the Sky, p. xi.


Watchers of the Sky appeared in 1922, honoring Copernicus, Tycho Brahe, Kepler, Galileo, Newton, William and Sir John Herschel. For many years Noyes had thought of composing such a work, but his immediate inspiration was a visit to Mount Wilson, California, the night the great one-hundred inch telescope, which had been ten years in the making, was first pointed to the skies. The Prologue contains a picture of the dramatic scene he witnessed—the testing whether years of labor would prove vain, through some unguessed-at flaw, or whether startling wonders of the heavens would be laid bare to the eyes of the watchers. One by one the astronomers mounted to view Jupiter, beholding a moon of the planet more clearly than ever before seen by mortals. One by one there followed, after the scientists, the working men of many nations who had labored to make the telescope perfect. At the point of highest interest in this scene, Noyes just misses conveying the drama of the situation, though elsewhere in the Prologue his
descriptions are vivid, imaginative. The finest; most poetically-achieved section of Watchers of the Sky is this Prologue, concluding with a picture of each torchbearer as he cries out to his follower,

Take thou the splendour, carry it out of sight
Into the great age I must not know,
Into the great realm I must not tread.

Throughout the book, which is made up of a collection of stories each complete in itself, Noyes holds firmly to his twofold aim, succeeding better perhaps in arousing our admiration for the men who have made possible modern astronomy than in revealing the Power that moves the universe. Interesting, instructive, and charmingly written though it is, too much pointing of the moral mars its unity. We feel often that when one of the astronomers speaks, whether it be Copernicus or Kepler or another, that he is only Noyes thinly masked, asserting his belief that each discovery leads to God.

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1 Noyes's Watchers of the Sky, p. 19
The narrative appeal is strong, so that the book is pleasant reading, particularly the account of Tycho Brahe, the Danish scientist, who studied astronomy secretly, married a peasant girl, and built a marvelous observatory and home, Uranisborg. These and other incidents of Tycho Brahe's life provide Noyes with the romance in which he delights. Some of the narratives are told directly, others through monologues and letters. In every case, the scientist's significant contribution to astronomy is stated. Keeping himself alive only by the hope of seeing his book in print, the dying Copernicus tells his friends about his conviction that earth moved around the sun. Tycho Brahe perfects his instruments, and patiently recording, numbers his thousand stars. To his guest, Sir Henry Wotton, Kepler acknowledges his debt to Tycho Brahe and explains how his belief in the relationship of music to stellar law led to his three great principles of planetary motion. Writing in behalf of her father, who was then
suffering persecution from the Church, Galileo's daughter describes the marvelous "optic tube" which revealed Jupiter's four moons. Newton, too, suffers from "the plague of little minds" but works on, analyzing light rays, building the first reflecting telescope, and formulating his laws of gravitation. While conducting his orchestra, William Herschel muses upon the harmony of music, mathematics, and astronomy and upon his discovery of the planet later called Uranus; his son, Sir John Herschel, carries on his investigations of the starry universes and nebulae and tells how his own prophecy of yet another planet came true when Le Verrier in France and Adams in England discovered Neptune. The Epilogue shows how the contribution of each scientist has played a significant part in developing modern astronomy, at the same time increasing our conception of divine law.

Watchers of the Sky is truly epic in scope and purpose, requiring a Milton to give the theme
the "high seriousness" needed to make it great. When we recall that Noyes is most at home in the realms of fancy, writing such delightful songs as *Forty Singing Seamen* and *The Barrel Organ*, we wonder, not that *Watchers of the Sky* misses greatness, but that its author succeeded so well in such a difficult task foreign to his genius. Violations of unity—in character portrayal, tone, and imagination—are numerous, yet Noyes shows considerable power in selecting, writing clearly and entertainingly, and perceiving meanings within the obvious. When we see Kepler's wife more interested in the salad she is preparing than in the reason for Sir Henry's coming from England, our sense of the "fitness of things" is offended, yet we find many real "purple patches" like these accounts of Newton:

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For far beyond, immeasurably far
Beyond our sun, he saw the river of suns
We call the Milky Way, that glittering host
Powdering the night, each grain of solar blaze
Divided from its neighbor by a gulf
Too wide for thought to measure.
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1 Noyes's *Watchers of the Sky*, p. 199
So watching, testing, proving, he resolved
The seeming random glories of our day
Into a constant harmony, and found
How in the whiteness of the sunlight
Sleep
Compounded, all the colours of the world.

Here and there in the volume are inserted songs about the stars and planets, most of them not especially effective. In one we are reminded of Shelley's *Ozymandias*, though it is less powerfully suggestive of man's futility. The lines are attributed to Copernicus, who considers astronomy in its beginnings among the Chinese, Arabians, and Babylonians:

In Bagdad of the purple nights,
Haroun Al Raschid built a tower,
Where sages watched a thousand lights
And read their legends for an hour.
The tower is down, the Caliph dead,
Their astrolabes are wrecked with rust.
Orion glitters overhead,
Aladdin's lamp is in the dust.

Like Tennyson, Noyes makes much of man's insignificance in this vast universe, a throng of

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1 Noyes's *Watchers of the Sky*, p. 199
2 Noyes's *Watchers of the Sky*, p. 34
midgets who "are sailing on a midget ball of
dust" Copernicus, while advancing his theory
of the earth's revolution, says, "Men think at
every turn of their own souls, the very heavens
have moved." Galileo, on his deathbed, says;

I have looked up there and seen
Too many worlds to talk of fame on earth.
Fame, on this grain of dust among the stars,
The trumpet of a gnat that thinks to halt
The great sun-clusters moving on their way
In silence.

Time after time, however, the poet reminds us
that knowledge of astronomy leads to greater reverence for God and man. Through the character of
William Herschel he declares:

Yet we, who are borne on one dark grain
of dust
Around one indistinguishable spark
Of star-mist, lost in one lost feather
Of light,
Can by the strength of our own thoughts
Ascend
Through universe after universe.

1 Noyes's Watchers of the Sky, p. 238
2 Noyes's Watchers of the Sky, p. 27
3 Noyes's Watchers of the Sky, p. 136
4 Noyes's Watchers of the Sky, p. 241
And Copernicus, speaking of how his heliocentric theory dwarfs man's conception of his importance, adds:

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\text{It is our own wild wings that dwarf the world.} \\
\text{To nothing beneath us. Let the soul} \\
\text{Take courage, then. If its thought} \\
\text{be true,} \\
\text{Not all the immensities of little minds} \\
\text{Can every quench its own celestial fire.} \]

Now and then appear interesting figures of speech from astronomy. When the poet first beholds the Mount Wilson observatory, it seems to him "a star, a needle-point of light, minute, remote."

The dome of the observatory, he says, is "moving on its axis like a moon." Looking down from Mount Wilson, he sees the lights of the cities below "clustered like constellations." "I can foresee the phrase," says the poet, "as Halley saw the advent of his comet." To him "each new grain of truth is packed, like radium, with whole worlds of

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1 Noyes's Watchers of the Sky, p. 29
2 Noyes's Watchers of the Sky, p. 1
3 Noyes's Watchers of the Sky, p. 273
4 Noyes's Watchers of the Sky, p. 272
5 Noyes's Watchers of the Sky, p. 219
light," and a fact is

Loaded with all significance, like the point
Of light that shows where constellations burn. 2

Noyes is careful to avoid very technical terms
and his explanations are easily understood. He ex-
ercises considerable ingenuity in the use of syn-
onyms, though a few phrases are repeated, such as
"midget ball of dust" referring to the earth,
"wisps of light" for nebulæ, "pearl" or "seed-
pearl" or "cloudy pearl" meaning a moon, and
"grain of dust" in allusion to a star or the earth.
He has a variety of terms referring to motion of
the earth, planets, and stars—revolving, moving,
wheeling, gliding, turning, flickering, circling,
rolling, sailing. In alluding to nebulæ he
compares them to milky streaks of fire, wisps of
light, luminous fans, brushes of electric mist,
star-mist, fire-mists. Almost the only brilliant
figures of speech are drawn from astronomy, and

1  Noyes's Watchers of the Sky, p. 275
2  Noyes's Watchers of the Sky, p. 198
even these are few. Other comparisons are chosen largely from music, color, and light. Though not in itself an achievement of highest rank, Watchers of the Sky uncovers a wealth of suggestive material for poetic and figurative use.

Alfred Noyes’s happiest moments come, when turning to the land of romance and fairy-lore, his fancy can have full sway and his rhythm follow his fancy. His use of astronomy in such poems, considering his close attention to scientific fact in Watchers of the Sky proves particularly interesting. No frequent nor new references occur, yet even in the delightful fantasy, The Tramp Transfigured, or the The Barrel-Organ, or the rollicking Bacchus and the Pirates, with its "Let rum go round while the world goes round," we find mention of the rotation of the earth. Rank and Files pictures men marching to eternity, keeping step to the law that binds stars and tides. The Prayer for Peace and Sailor King also emphasize universal law, the latter containing the figure of planet-

Noyes’s Collected Poems, Vol. 2, p. 56
nations moving about the central sun. **Lucifer's**
Fat voices indignation that we who stare through
heaven and weigh the stars have not dared to em-
brace world fellowship "are our little sun grown
cold." **In'Tween the Lights** the poet's interest
in science and fairyland meet. We have named the
stars and weighed the moon, he says, yet we have
not found wisdom; so he calls,

Fairies, come back. Our wisdom dies
Beneath your deeper, starrier skies!
We have reined the lightning, probed
the flower:
Bless, as old, our twilight hour.  2

Noyes has not been alone in his interest in
astronomy; many of his contemporaries have made
numerous allusions to well-established principles
of the planetary movements, origin of the earth,
and immensity of the starry universe. More than
two hundred years before Christ, Aristarchus of
Samos had advanced a heliocentric theory which
found little or no support in his time. Later

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Copernicus and Galileo suffered persecution for affirming that the earth, turning, gave us the apparent circling of the sun. In *Paradise Lost* Milton refers to this hypothesis, then being disputed by men of his day. Wordsworth gives us the well-known line, "Roll'd round in earth's diurnal course," and Tennyson the poem beginning, "Move eastward happy earth." But it remained for our twentieth century poets to make the term "the spinning earth" a literary commonplace. The idea is popular with James Stephens: Thomas an Beile says of God,

He lifted up His hand-- I say He heaved a dreadful hand Over the spinning earth. 2

J.C. Squire expresses the passage of time by the world's "slow rolling through its light and darkened hours;" while Masefield describes it as "again and again the alternating light and darkness spin." Even one of the vagabonds in *Salt Water*

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1 Tennyson's *Poems*, p. 129
2 Untermeyer's *Modern British Poetry*, p. 169
3 Squire's *American Poems and Others*, p. 71
4 Masefield's *The Everlasting Mercy*, p. 227
Ballads uses the popular term:

An' why I live, an' why the old world spins,
Are things I never knewed;
My mark's the gypsy fires, the lonely inns,
An' jist the dusty road. 1

In Seascape Francis Brett Young pictures the sea holding its wealth until "this rolling planet reel on its axis." Again, in The Quails, he finds no reason for resentment against man,

. . . . . . . . . seeing that each of us,
Lured by dim hopes, flutters in the toils of death
On a cold star that is spinning blindly through space
Into the nets of time. 2

Clifford Bax, in A Berkshire Holiday, describes a feeling that many of us have experienced, when he says,

The stars begin to seem so near that,
shuddering back in panic fear,
The gazer feels that in midflight the spinning earth may fall. 3

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1 Masefield's Salt Water Ballads, p. 85
2 Georgian Poetry, 1920-22, p. 192
3 Georgian Poetry, 1920-22, p. 198
4 Drinkwater, Canby, Benet's Twentieth Century Poets, p. 213
The earth is also variously termed "the turning star of shifting sea," "the rotating earth," "the rolling planet," and "the turning earth." When reference is made of its revolution about the sun, it is often named "the wheeling world." Though technically not a star, our planet has become merely a star among stars to many poets. Several poets voice their consciousness of turning with the earth as it rotates. In Ecstasy by Robert Nichols we find: "My body turned, one with earth's turning round," and in another poem,

And, turning with the earth, I was aware
How suddenly the eastern curve was bright. 2

But the mood is best expressed in his Night Rhapsody, which reminds us of Conrad Aiken's Morning Song from "Senlin" where Senlin, prosaically standing before his mirror tying his tie, is aware that the earth is a "swiftly tilting planet." Night Rhapsody pictures the poet, awaking at night when all is so silent he can "brood apart in calm and joy," becoming conscious "of the huge universe which turns

1 Nichols' Ardours and Endurances, p. 199
2 Nichols' Ardours and Endurances, p. 4

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without" and the earth "tilted on axle-tree, in slow gyration."

How beautiful to wake at night,
Within the room grown strange, and still, and sweet,
And live a century while in the dark
The dripping wheel of silence slowly turns. 1

Harold Monro, who has shown especial interest in gravitation, writes imaginatively, though in a less ecstatic mood, of a similar experience, in

**While We Sleep:**

The earth takes up our bodies, every one,
And brings them slowly backward to the dark;
Then on her shadowed side we droop and slumber
Turned from the sun.

We travel through the darkness: we are spun
Upward through rays of light into the morning.
We waken with the earth: we glide from slumber
Toward the sun. 2

Alluding to night as earth's shadow is fairly common. *Christ in Hades*, which appeared before 1910, by Stephen Phillips refers to mankind.

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1 *Georgian Poetry, 1920-22*, p. 130
2 *Monro’s Real Property*, p. 62
Half in the shining sun upright, and
half
Reposing in the shadow; 1

and Richard Hughes says,

From pole to pole the shadow of the world
Creeps over heaven, till itself is lit
By the very many stars that wake in it. 2

Gordon Bottomley in an early poem uses the idea
figuratively,

This night that is the shadow of a star
Is like love's shade of unsuspected care,
And those within it passionately forget
The radiance that casts it at their feet. 3

D.H. Lawrence's *Kisses in the Rain* makes an
ingenious comparison of man's heart controlling the
senses as the center of gravity holds the spinning
earth to its course in the universe:

But my heart at the centre
Of all, in a swound
Was still as a pivot,
As all the ground
On its prowling orbit
Shifted around.

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1. Phillips's Poems, p. 105
3. Bottomley's Poems of Thirty Years, p. 156
And the world all whirling
Around in joy
Like the dance of a dervish
Did destroy
My sense--and my reason
Spun like a toy,
But firm at the centre
My heart was found
My own to my perfect
Heart beat bound,
Like a magnet's keeper
Closing the round. 1

"Fit for perpetual worship" is the force of gravity according to Harold Monro; he enshrines it as his domestic god, whose orderly ways we call Fate, "and when they most delight us, call them beauty." Man builds, plants, manufactures, says Monro, under control of gravity, the silent unknown power of earth:

I have some little human power
To turn your purpose to my end,
For which I thank you every hour.
I stand at worship, while you send
Thrills up my body to my heart,
And I am all in love to know
How by your strength you keep me part
Of earth which cannot let me go;
How everything I see around,
Whether it can or cannot move,
Is granted liberty of ground,
And freedom to enjoy your love. 2

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1 Braithwaite's Book of Modern British Verse, p. 250
2 Georgian Poetry, 1918-1919, p. 99
Although its explanation was unknown until Newton advanced his theory of gravitation in 1666, the influence of the moon upon the tides had been observed by the ancients. Allusion to this well-known phenomenon continues to appear in English poetry as it has for centuries, although in no way comparable to the frequency with which reference to the rotating earth occurs. George Darwin's treatises on the tides, published in the late nineteenth century, have given greater prominence to the idea. Noyes introduces into his account of Tycho Brahe in Watchers of the Sky a song wherein the moon is personified as a white shepherdess leading the sea. In The Widow in the Bye Street Masefield compares the high tides made by love in a man to the triumph of the tides "when the white moon fills," and suggests the moon's influence in these lines from The Everlasting Mercy:

The water's going out to sea
And there's a great moon calling me;
But there's a great sun calls the moon,
And all God's bells will carol soon
For joy and glory and delight
Of someone coming home tonight.

1 Masefield's Everlasting Mercy, p. 122
2 Masefield's Everlasting Mercy, p. 77
"The moon rocked to and fro her watery couch" is Viola Meynell's suggestive figure, while Francis Bretz Young speaks simply of the "moon-chained tides." More original is the comparison in Isaac Rosenberg's The Jew:

Moses from whose loins I sprung,  
Lit by a lamp in his blood  
Ten immutable rules, a moon  
For mutable, lampless men.  
The blonde, the bronze, the ruddy,  
With the same heaving blood,  
Keep tide to the moon of Moses,  
Then why do they sneer at me?  

As early as men looked upon the heavens with curious eyes, they named its brightest stars and constellations, weaving legends about them. From the dawn of astronomy poets have utilized this mass of starry legend and fact. Even in the doggerel so familiar to children about "One little, two little, three little Injuns," according to Garrett P. Serviss in Astronomy with the Naked Eye, the author made use of the Indian name for the

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1 Untermeyer's Modern British Poetry, Rev. Ed. p. 311
2 Georgian Poetry, 1920-22, p. 192
3 Untermeyer's Modern British Poetry, Rev. Ed. p. 317

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Big Dipper, Seven Little Indians. Masefield in The Everlasting Mercy uses the name most popular in England, alluding to the Plough that "tips round the Pole." Shakespeare earlier used a term familiar in his day and called this constellation Charles' Wain, a name supposed to have come from Charlemagne's Wain. We usually associate our names for the constellations with Greek mythology, but most of these have been traced to Semitic origins. Various attempts to replace the pagan names with Christian names have been futile. Poetic reference to the planets and constellations is very ancient as well as very modern. Among the so-called Homeric Hymns is one to Castor and Pollux of the constellation Gemini; and Robert Graves of our own day has made them the subject of a stanza in his Star-Talk. Homer mentions one planet, Venus, which he calls "the Beautiful"; Ronald Ross, a modern physician,

1 Serviss's Astronomy with the Naked Eye, p. 70
2 Masefield's The Everlasting Mercy, p. 55
3 King Henry IV, Part I, Act II, Scene 1.
has written Hesperus, using the name by which Venus was known as an evening star. The thirty-eighth chapter of Job mentions Orion, the Pleiades, and Arcturus; man "has called a far-off glow Arcturus" according to W.J. Turner. Aratus, living at the Macedonian court about 270 B.C., wrote a versified treatise on the constellations; in four lines of The Flower of Fame Robert Nichols enumerates seven of them. Dante is supposed to have referred to the Southern Cross, when, in the first canto of Purgatory, he speaks of the "four bright stars," although this constellation was not introduced to astronomy until 1679 by Augustine Royer; among modern poets V. Sackville-West mentions that "The Southern Cross looks over to the Bear."

Newer constellations, such as Telescopium and Microscopium, named in 1763 by Nicolas Louis da Lacaille, do not appear among the poems considered in this study. Little more recent knowledge about the stars, constellations and planets has been utilized. V. Sackville-West's mention of Aldebaran and Betelgeuse in Full Moon is uncommon, although

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1 Serviss's Astronomy With the Naked Eye, p. 162
2 Georgian Poetry, 1920-22, p. 163
the names themselves are very old. "The pearly planet brimmed with light" of which Nichols speaks in *The Flower of Venus* may have reference to knowledge that Venus is surrounded by a cloudy atmosphere. Scientific and fanciful treatment are contrasted by John Freeman in his poem about Venus, *The Evening Sky*. According to fancy the planet is "rose-bosom'd and rose-limb'd" as she steps "mid the twined boughs of the night," but,

Venus, ever the astronomer,  
Not thus idly dancing goes  
Flushing the eternal orchard  
with wild rose.  
She through ether burns  
Outpacing planetary earth,  
And two years triumphantly returns,  
And again wave-like swelling  
flows,  
And again her flashing apparition  
comes and goes. 3

Among the poets writing between 1910 and 1925 Robert Graves, alone, seems greatly interested in particular constellations and planets. *The Sucks*  

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2. *Nichols' Aurelia*, p. 65
and the Bull, a description of the two constellations has little significance here. *I Am the Star of the Morning* is more interesting because it follows Isaiah’s terminology of "Lucifer, son of the morning," which has been identified with the planet Venus. At an early time, it will be remembered, Venus was thought to have been two distinct planets, called Phosphorus in its morning phase and Hesperus in its evening appearance. *In Memoriam* has a reference to "sweet Hesper- Phosphor, double name for what is one." Ronald Ross and Rupert Brooke also use the name Hesperus. Although he borrows Isaiah's term Lucifer, which Christian theologians thought referred to Satan in the lines "How art thou fallen from the heavens, O Lucifer, son of the morning," Robert Graves does not use the theologian's interpretation. Instead, he pictures Lucifer, or Venus, as a star lost in "Night's myriad more counterfeit giants," and during the day "overwhelmed by tyrant blazing of

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1 Isaiah, xiv, 12
2 Tennyson's *Poems*, p. 514
the warrior sun." Star-Talk records a conversation among the stars on a cold night. Curiously the poet uses Gemelli in place of the usual Gemini for the twins, and does not include the seventh or "Lost Pleiad" among its sisters. The following stanza shows the light, fanciful treatment:

"How is your trade, Aquarius, This frosty night?"
"Complaints is many and various And my feet are cold," says Aquarius, "There's Venus objects to Dolphin-scales, And Mars to spawn found in my pails, And the pump is frozen to-night, And the pump is frozen to-night."

While their treatment of the heavenly bodies adds little scientific information, the attitude of these modern poets toward the magnitude of the universe and the majesty of awful law that governs stellar motion does merit attention. We have seen how greatly Tennyson was impressed with the vastness of worlds beyond our own, with the littleness of man, and the might of universal law. Later poets, also, have been aware of these things, for modern astronomy with its telescopes and spectro-
scopes has pushed out the boundaries of space so far that we cannot grasp their revelations, and even fear to look beyond our little existences. John Drinkwater speaks of such "out-measured minds" seeking "to conceive the unconfined," and in The Boundaries he concludes,

Although beyond the track of unseen stars
Imagination strove in weariless might,
Yet loomed at last inviolable bars
That bound my farthest flight.

At times Drinkwater finds the sight of the "golden troops in charted motion set" very beautiful; at other times their immensity and impersonality bring distress, yet he voices faith in the God who shall reveal their mystery. These attitudes are expressed in the selections which follow, the first from Travel Talk; the second from Expectancy; and the last from A Prayer.

And we saw
The everlasting ritual of sky
And earth and the waste places of the air,
And momently the change of changeless law
Was beautiful before us.

1 Drinkwater's Collected Poems, Vol. 2, p. 2
2 Drinkwater's Collected Poems, Vol. 1, p. 143
3 Drinkwater's Collected Poems, Vol. 1, p. 164
4 Drinkwater's Collected Poems, Vol. 1, p. 102
I know that I am lost in a great waste,
a trackless world
Of stars and golden days, where shadows go
In mute and secret haste,
Paying no heed to supplianting cries
Of spirits lost and troubled. 1


We would not break the bars
Thy wisdom sets above us; we shall climb
Unfettered to the secrets of the stars
In Thy good time. 2

Here, not only are Drinkwater's lines sonorous, but they are also suggestive, linking man's destiny with the secret of the heavens. No other poet within this fifteen year period succeeds so poetically in making us aware of celestial order and immensity, although we find many interesting incidental references to these ideas. Peter Quenell states that "keen Intelligences" turn away "from the mathematic splendour of the spheres incessant rolling chime." The "Lonely God" of James Stephens's imagination seeks refuge on earth "from light astounding and the wheeling tide of roaring skies." In The Breath of

1 Drinkwater's Collected Poems, Vol. 1, p. 12
2 Drinkwater's Collected Poems, Vol. 1, p. 7
3 Drinkwater, Canby, Benet's Twentieth Century Poets, p. 268
4 Georgian Poetry, 1911-12, p. 185
Life the poet ascends in fancy "past the rocking stars out to where the aether failed in spaces sharp and bare." Masefield refers to God's bidding "the changing stars fulfill their turn." A centaur created by Robert Nichols wonders that,

All night the constellations turn Round the dark pole and none knows why.

In a light, more whimsical than poetic vein Stephens states his conclusions from observing astronomical law:

What's the use Of my abuse?

The world will run Around the sun

As it has done Since time begun,

When I have drifted To the deuce;

And what's the use Of my abuse!

The Sirens by Laurence Binyon includes a dignified and rather successful treatment of man's

1 Stephens's Collected Poems, p. 220
2 Masefield's The Everlasting Mercy, p. 197
3 Nichols's Ardours and Endurances, p. 62
4 Stephens's Collected Poems, p. 216
search to reveal the secrets of the heavens. The passage beginning "Hymn the seekers" sounds much like the Prologue to Watchers of the Sky. Early man, the poet says, was overwhelmed by the vastness of the universe so he arrayed--

In a constellated robe  
His heaven-projected effigy,  
Because his spirit was afraid  
Of its nakedness, nor dared  
Terrors of the truth to probe;  
Rather chose itself to ensky  
In a dream. But no night bared  
To him her grandeur, swerved no spheres  
To the wrench of human fears.

Hymn the seekers! them that saw,  
Past the seeming starry roof  
Of human earth, in mazy plan  
Bright eternities of law;  
Them that neared those orbs to man  
Unafraid, and put to proof  
Divination's ancient scheme;  
Stept into the timeless stream  
Star-like spirits among the stars. 1

Another idea that has caught the imaginations of modern poets is that of the death of worlds. J.C. Squires's The Moon pictures the "pale satellite, old mistress of our fire," watching its "fellow-  

1 Drinkwater, Canby, Benet's Twentieth Century Poets, pp. 80-81
traveller," the earth, in process of evolution, then reversion—shaking off the vapor left by vanished gleams of fire, growing wrinkled and cold while subject only to the elements, supporting life for a period, finally becoming only "a glimmering disk of empty light and shade." World creation—from fire to fog, to dust, to beast, to mind—is also referred to in Monro's Gravity. Masefield describes some friends in Biography as men "to whom this earth was but a burnt-out coal." Gibson's Fire contains a figure which compares the angry outbursts of rage among men to the terror that menaces "a crumbling world with fiery, molten core." Apparently these poets are rather pessimistic concerning the earth's future in the light of what astronomy has to say. J.D.C. Pedlow questions in When All Is Said:

When cooling sun
And stone-cold world,
Together hurled,
Flame up as one—

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1 Squire's Poems, Second Series, p. 58
2 Masefield's The Story of a Roundhouse, p. 172
3 Georgian Poetry, 1920-22, p. 75
O Sons of Men
When all is flame
What of your fame
And splendor then? 1

With the exception of poems clearly fanciful, such as Graves's Star-Talk and the general use of the word star rather than a technical one, the selections we have so far noted have been fairly accurate in treating of astronomical ideas now popularly held to be true, though some are centuries old. But contemporary poets have frequently borrowed one theory long ago discarded, the Pythagorean concept of the music of the spheres. The history of its use by poets is fascinating. According to the ancient Greek belief, the planets, rotating within crystalline spheres, produced a heavenly music inaudible to mortals but heard by the gods. By extension of the idea, poets have attributed music to all the stars. We are familiar with the line in Job, "When the morning stars sang together" 2 and with Shakespeare's figure in The Merchant of Venice:

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1 Georgian Poetry, 1920-22, p. 140
2 Job 38: 7
There's not the smallest orb which thou beholds't
But in his motion like an angel sings,
Still quiring to the young-eyed cherubims.
Such harmony is in immortal souls,
But whilst this muddy vesture of decay
Both grossly close in we cannot hear it. 1

So, too, in modern British poetry the music of the stars appears as a common allusion, persisting side by side with more scientific ideas. Through the characters of Kepler and the two Herschels, Noyes in *Watchers of the Sky* discourses upon the heavenly harmonies in accord with music. Elsewhere the idea is not developed very much, scarcely more than mentioned. Thus we hear of "frozen music" among the constellations in Graves's *Snake and the Bull*; of the "spheres' incessant rolling chime" in Quennell's *A Berkshire Holiday*; of Stephens's "whistling stars" and "roaring stars." Apparently Ralph Hodgson had the same idea in mind when he wrote these lines in the *Song of Honour*:

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1. *Merchant of Venice*, Act V, Scene 1
2. Graves's *Poems*, p. 101
3. Drinkwater, Canby, Benet's *Twentieth Century Poets*, p. 268
4. Stephens's *Collected Poems*, p. 133
The song of men divinely wise
Who look and see in starry skies
Not stars so much as robin's eyes,
And when these pale away
Hear flocks of shiny pleiades
Among the plums and apple trees
Sing in the summer day. 1

Monro thinks that "the stars must make an
awful noise in whirling round the skies," even
though he cannot hear their loudest song, while
James Elroy Fletcher imagines that "harping
planets talk love's tune." One of the most charm-
ing expressions of this fancy of starry music is
found in Noyes's well-known The Tramp Transfigured,
where old Bill, lying on the grass looking up to
the "twenty million miles of stars that roll like
one" says,

There you'd hear-like growing grass--
a funny silent sound, sir,
Mixed with curious crackles in
a steady undertone,
Just the sound of twenty billion
stars a-going round, sir. 4

Perhaps in continuing this antiquated tradition,

1 Georgiaan Poetry, 1913-15, p. 145
2 Monro's Strange Meetings, p. 12
3 Georgiaan Poetry, 1913-15, p. 109
4 Noyes's Collected Poems, Vol. 2, p. 50
the poets are not entirely unscientific, for there is a wonderful harmony of effect produced by the stars, as Serviss points out in *Astronomy With the Naked Eye*, which is photometric rather than sonometric. "It is the true music of the spheres," this writer affirms, "for who shall say that the universally felt influence of the star-bedight heavens does not arise from our instinctive, but as yet uneducated, perception of a concord which is not of 'sweet sounds,' but of light and color, whose range of vibrations in the ether infinitely exceeds that of sonant oscillations in the atmosphere?"

When we look for examples from scientific fields other than astronomy, we find a surprisingly meager amount of material. Inasmuch as these fields are so closely related and frequently overlap, we have considered under astronomy some references that may as properly belong to physics, chemistry, and geology, for instance, allusions to the creation and development of the earth as in Squire's *The Moon*. His *The Birds* gives the more definitely

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1 Serviss's *Astronomy With the Naked Eye*, p. 13
geologic and biologic concept of development, showing changes in climate, land formation, appearance of life, and early civilization of man. Interest in organic evolution, so strong in the nineteenth century, seems to have died down somewhat, although, as we have noted, it still appears in references to the creation of the earth. Several poems by W. J. Turner, The Caves of Auvergne, In Camp, and Magic deal with the beginnings of civilization recorded by the cave-man when he carved pictures upon the walls of his rude home. Mastodon, a name first appearing in 1813 in England, though coined by Cuvrier a few years earlier, is referred to by Bottomley and Gibson. The latter describes the elephant as shaped by "aeons of primeval power" and "descended from the mastodon." Robert Graves in his versified and almost incomprehensible criticism, The Marmosite's Miscellany, mentions the "struggle for existence," another nineteenth century term.

An interesting note with regard to the poet's

1 Georgian Poetry, 1918-1919, p. 174
2 Georgian Poetry, 1913-1915, p. 122
picturing, in this same poem, a monkey scratching for fleas, explains that a zoologist objected that monkeys do not have fleas. But the poet concludes that the popular proverb about a monkey and his fleas justifies the error. It seems that scientists do have some direct influence upon poets! The Monkey's Cousin, also by Graves, is little more than a jingle which makes capital of a popular interpretation of evolutionary theory.

Marmosite's Miscellany also contains a curious allusion to the chemist Kekule, who in 1865 formulated the "closed-ring" (or linking of atoms) theory of the constitution of benzene. A great part of modern organic chemistry has resulted, directly or indirectly from this theory. To anyone who knows of Kekule's work the figure has force:

Thought comes often clad in the strangest clothing.
So Kekule, the chemist, watched the weird rout
Of eager atom-serpents winding in and out,
And waltzing tail to mouth; in that absurd guise
Appeared benzene and anilin,
their drugs and their dyes. 3

1 Graves's Collected Poems, p. 199
2 Graves's Collected Poems, p. 139
3 Graves's Collected Poems, p. 189
The word "atom" is used here technically, but more frequently among modern poets it has a very general meaning of small particle. Lucretius, it will be remembered, based his De Rerum Natura upon an "atomic theory." The chemist's powers of dividing matter and putting it to man's use are mentioned by Laurence Binyon, who sees man holding "fabled terrors of the ancients in his hand, in a handful of dust, earthquake and pestilence." But nothing so startling occurs among these British poets, in reference to chemistry and physics, as S. Foster Damon's Rock of Ages, which concludes,

Suddenly God Atom burst.
Electron! Be not cleft for me!
Let me build my faith on thee! 2

Conservation of matter and energy is an old concept that recent discoveries in physics and chemistry have strengthened. In expressing his belief that nothing dies, Rupert Brooke says,

One mote of all the dust that's I
Shall meet one atom that was you. 3

1 Binyon's The Sirens, p. 27
2 Saturday Review of Literature
3 Georgian Poetry, 1911-1912, p. 38
Stephens's *Psychometrist*, the title referring to a pseudo-science which professes to divine properties of an object from physical contact, contains the idea of conservation of energy. The stone speaks,

The force that bindeth me so long,
Once sang in a linnet's song;
Now upon the ground I lie,
While the centuries go by.

Linnets shall for joy stone
And be fashioned into stone,
While, upon the waving tree,
Stones shall sing in ecstasy.

"The Scientist's Philosophy" might well be the title of an unnamed poem by Masefield, beginning

What am I, Life? A thing of watery salt
Held in cohesion by unresting cells.

Masefield here considers the marvels of man's physical being, "this ever altering thing which yet persists," and concludes that we are neither heaven nor earth and that our joys are earthly joys--a woman's beauty, a child's delight, the discovery of a "guessed-at satellite." The rather lengthy quotation which follows shows the influence of modern scientific thought:

1 Stephens's *Collected Poems*, p. 148
If I could get within this changing I,
This ever altering thing which yet persists,
Keeping the features it is reckoned by,
While each component atom breaks or twists,
If, wandering past strange groups of shifting forms,
Cells at their hidden marvels hard at work,
Pale from much toil, or red from sudden storms,
I might attain to where the Rulers lurk;
If, pressing past the guards in those gray gates,
The brain's most folded, intertwined shell,
I might attain to that which alters fates,
The King, the supreme self, the Master Cell;
Then, on Man's earthly peak, I might behold
That unearthly self beyond, unguessed, untold.

John Masefield, the poet, has appropriated modern science to his uses; what happens when Ronald Ross, the scientist, turns poet? "The hymn written on the day after his great discovery (of the malarial germ in the mosquito) is very noble testimony from science to art," according to the editors of Twentieth Century Poetry. There

1
Georgian Poetry, 1916-17, p. 91

2
Drinkwater, Canby, Benet's Twentieth Century Poetry, p. 97

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is little use of scientific terminology, however, and, with the exception of the first stanza, the thought seems bound by the form, thus destroying naturalness and ease of diction. The opening lines read,

This day relenting God
Hath placed within my hand
A wondrous thing; and God
Be praised. At his command,
Seeking his secret deeds
With tears and toiling breath,
I find thy cunning seeds,
0 million-murdering Death.

Other borrowings of terms and ideas from medical science are scattered. Because there is no cruelty imagined by man to equal that brought by "blind spores of pestilence," Francis Brett Young utters a note of pessimism in The Quails. Squire refers directly to "angina pectoris" while meditating upon men who have died "not fighting but impotent." Amaurosis, loss of sight through decay of the optic nerve, is used figuratively by Robert Nichols,

1 Georgian Poetry, 1920-22, p. 198
2 Georgian Poetry, 1920-22, p. 185
An amaurosis as to want is due
To those who bear the cross yourself
should carry. 1

There is a suggestion in *Watchers of the Sky*
that Noyes planned a tribute to the heroes of
medicine, possibly the third book of his *Torch-
bearers*, for he speaks of,

Dreamers of dreams, the builders of
our hope,
The healers and the binders up of
wounds,
Who, while the dynasts drenched the
world with blood,
Would in the still small circle of
a lamp
Wrestle with death like Heracles of
old.
To save one stricken child. 2

Physiology and psychology are mentioned
but little, although Graves's *The Image of the Neck*
is an interesting, if not highly poetic, treatment.
He, instead of locating the center of life's mys-
tery in the cell as did Masefield, places it where
the spinal cord enters the brain, "where the close
chaplet of thought is bound." "Ganglion", a term

1. Nichols's *Aurelia and Other Poems*, p. 36
2. Noyes's *Watchers of the Sky*, p. 17

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which appeared in its physiological meaning in 1732, is referred to by Bottomley. J. Redwood Anderson compares the wires running from the cab of a crane to the nervous system,

While from the cab, as from the brain
Nerves run to the least cell,
Wires,
Threading the monstrous whole
Flash to all parts, from that small citadel
Inaudible mandates to make known
Mankind's desires.

No Erasmus Darwins appear among the modern poets; indeed, botany is almost wholly neglected. Common names of flowers and plants are preferred to more scientific names. A few figurative uses occur in which botanical terms, not unusual but probably reinforced by frequent reference in science, are employed. Heat is compared to "laburnum-gold," alluding to the bright yellow flowers of the shrub laburnum; sun, waves, winds, and birds are not "parasites" like plants and birds," rooted

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1 Bottomley's Poems of Thirty Years, p. 5
2 Drinkwater, Canby, Benet's Twentieth Century Poetry, p. 243
3 Drinkwater, Canby, Benet's Twentieth Century Poetry, p. 24
in that which fed them yesterday; the wriggling neck of a camel is likened to a hydra. Nichols uses the word "glaucous," as a descriptive term meaning overcast with a whitish bloom, and in Night Bombardment mentions "the pistol-light's pale spores." A purely descriptive passage about the Medusa, in Noyes's The Rock Pool, ends with this line indicative of modern thought; "the vanishing point of life, the light whence life begun." Although he does not employ scientific names, W. J. Turner in Fantasia, shows a more than ordinary acquaintance with sea plants. His figure, describing musicians, is a curious one:

While all the world through their frail bodies flows,
Ebbs from their finger-tips-swells-and sways,

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1. Georgian Poetry, 1911-12, p. 161
2. Georgian Poetry, 1913-15, p. 122
3. Nichols's Aurelia and Other Poems, p. 72
4. Nichols's Ardours and Endurances, p. 21
Hanging upon their lips, and rocks them all
In rooted motion—sea-urchins, sea-farers
In among the sunflowers,
In among the x-rays, the trepang and the
colander;
The polyps spread their fringe of arms, the
drunken algae reel around
Far from the dripping guillemot. 1

It is evident from this brief survey of poetic
borrowings from sciences other than astronomy that
these poets have not yet tapped many sources, de-
spite the hint here and there that some are beginning
to do so—witness Masefield's poem about the cell,
Graves's *The Hare of the Neck* and reference to
Kekule. Among the Sitwell group, since it is known
to depart from conventional form and thought more
than other modern British poets, we should expect
to find greater interest, perhaps, in modern science
or more daring use.

The Sitwell group, as we have noted earlier,
includes the three Sitwells, Aldous Huxley, Geoffrey
Cookson, Wilfred Owen, and Iris Tree. There are
others, to be sure, who publish occasionally in
*Wheels*, but these named are the ones who show some

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1  *Turner's The Hunter and Other Poems*, p. 21
interest in science. While they are distinctive in some of their borrowings, they also follow some of the trends already discussed. Like their contemporaries they are interested in astronomy, new and old. "The spinning earth" is not a commonplace with them, the only similar example found being Edith Sitwell's description of The Dancers during a great battle:

The floors are slippery with blood; The world gyrates, too.1

The moon's effect upon the tides, as well as its relation to the earth, is used but with the earth as satellite instead of the moon, in the following description by Geoffrey Cookson:

And he is but a brown-limbed slave, And she the horned Queen of Night; She draws him as the moon the wave, He spins, her frantic satellite. 2

No parallel to Wilfred Owen's reference to the moon as seen through the telescope has been noted before, although the knowledge is very common. It reminds us, however, of Squire's

1 E. Sitwell's Clown's Houses, p. 25
2 Wheels, 1920, p. 50
description of the world as viewed from the moon. Owens imagines his soul, in company with Death, looking down from a height toward a dreary land.

Gray, cratered like the moon with hollow woe,
And filled with great pocks and scabs of plagues. 2

Wheels contains three unusual astronomical comparisons, unusual not in choice of scientific facts presented but as figures of speech. In one, Osbert Sitwell compares the passage of the earth through part of its orbit to a dull Sunday:

The gilt-fring'd earth has sadly spun
A sector of its lucent arc
About the disillusioned Sun
Of Autumn.

We, too, have spun our Sunday round,
Of Church, and beef and after-sleep. 2

Edith Sitwell and Aldous Huxley give us two novel figures. The former describes a merry-go-round, the latter some trapeze performers and a juggler. Selections from these descriptions follow, the first from Myself on the Merry-Go-Round.

1 Wheels, 1919, p. 52
2 Wheels, 1920, p. 14

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the second from Theatre of Varieties:

The giddy sun's kaleidoscope--
The pivot of a switchback world
Is tied to it by many a rope:

The throbbing whirling sun that drags
The streets upon its noisy round. 1

The Six Aerial Sisters Polpetini
Dive from trapeze to far trapeze
With all the clockwork certainty of stars.
About his head Sclopis, the juggler keeps
In unremitting planetary dance
A little host of silver spheres,
Builds up a solid arch of movement.
If he should drop an atom? or if they
Lose hold too soon and fall? 2

The idea of starry music makes common ground
between the Sitwells and other modern poets. Edith
Sitwell, like the writer of Job, mentions the stars 3
of heaven singing for joy, and Aldous Huxley "the
song of wheeling planetary rings." Imagining that
he reaches "a shining distant point of light,"
Osbert Sitwell finds himself in a glory of light and
sound. Noyes uses the same idea, that of "the point
of light" revealing whole constellations, but does

1 Wheels, 1918, p. 90
2 Wheels, 1920, p. 36
3 Untermeyer's Modern British Poetry, p. 207
4 Wheels, 1919, p. 22
not extend it to the music of the stars as Sitwell does in the lines which follow:

Cadences rose and fell unendingly—
Quivering, shining waves of sound
and sight—
Sounds of the universe—the cries
of space
And planets tumbling wildly round
our world
Showing the meaning of the meaningless. 1

Only Osbert Sitwell of this group seems greatly impressed by the vastness of the heavens, whereas the other poets discussed react strongly to celestial law and magnitude. The Beginning, an account of earth’s creation, assumes the earth originally to have been a ball of fire, like other stars.

Rocks ablaze
Leap upward to the sun, or fall beneath
The rush of our rapidity, that seems
Catastrophe, and not the joyous birth
Of yet another star.

Then night comes on, and shows the
flaming path
Of all the rocks that vainly seek the
sun,
Broad as the arch of space, a myriad
moons
Sail slowly by the sea; the glowing world
Shows up the pallor of their way. 2

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0. Sitwell's Argonaut and Juggernaut, p. 29
2. Sitwell's Argonaut and Juggernaut, p. 54-55
Most striking of the scientific terms appearing in the Sitwell poetry is the word "stalactite."

If we except The Beginning, we find scarcely another reference to geology, yet this word is employed again and again. Evidently, too, its users have in mind the form only, not the composition, natural color, or origin, for it is "glassy" or "wooden", "green" or "pink" at will. All the uses are figurative, sometimes so much so that the meaning suffers. Twice Edith Sitwell uses the term to describe rain, once as "the crude pink stalactites of rain;" again as "dull blunt wooden stalactites of rain, hardened by the light." In another poem she makes the lights shine through bird songs, which are "like coloured hoops upon the air," "in splintered glassy stalactites." Her brother Osbert sees the sunlight dropping through porous leaves as "a dripping stalactite of green;" and he also turns the leaves "to frozen water-falls, cool

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1. E. Sitwell's Sleeping Beauty, p. 91
2. Untermeyer's Modern British Poetry, Rev. Ed. p. 328
3. Wheels, 1920, p. 110
4. Wheels, 1920, p. 18
stalactites" that are melted by the wind, and drip coolness. Where the figure becomes symbolic of an idea rather than descriptive of an object, the meaning may be still more obscured, for instance, when Edith Sitwell has the Dean say his gaiters are like tree trunks,

Not pillars of the Church that freeze
To stalactites of boredom through
Long centuries of sermons; 2

or when Sackeverell Sitwell describes the Valse Estudiantina in these distorted figures,

A wall of cactus guards the virgin sound
Dripping through the sword-edged leaves
The wayward milking
Of your mental stalactites
On the strung bells of music,
Arrests the moment,
Petrifies the air. 3

Rarely does one of the Sitwell group allude to physics or chemistry, and the few references are not significant. Interest in biology is somewhat greater, with scattered allusions to "vivi-

1Wheels, 1919, p. 16
2E. Sitwell's Clowns Houses, p. 12
3Wheels, 1919, p. 31
secting our souls, "lymphatic paint," "brain-cells called home," "microbes that subdivide and never die," and the air "aching with epidermal magnetism." The two poems of the Sitwell group most important for the purpose of this study are biological, Aldous Huxley's *Fifth Philosopher's Song* and Sherard Vines's *Elan Vital*. The former begins with the rather startling line "A million million spermatozoa." Though the term is common now in biological studies, having been introduced in 1836, its use in poetry, is to say the least, uncommon. Huxley's theme is a variation of the struggle for existence idea applied to spermatozoa rather than to the developed organism. The "fittest," however, in the sense of the one of greatest human worth, is not the one which survives:

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1. *Wheels*, 1919, p. 43
2. *Wheels*, 1919, p. 78
4. *Wheels*, 1919, p. 57
5. *Wheels*, 1918, p. 30

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And among the billion minus one
Might have chance to be
Shakespeare, another Newton, a
new Donne.
But the one was Me. 1

Elan Vital affords interesting comparison with
Davidson's Anthropological Theology and Masefield's
poem beginning, "What is Life," It combines many
modern scientific concepts—origin of life from
inanimate cells, evolution through prehistoric
animals triumphing in man, continuation of life
through "the everlasting sperm and egg," chemical
composition of living matter, and man's failure
to "dissect" life. In evolutionary theory it
resembles Anthropological Theology; in consider-
ing the cell as the unit of structure and made up
of chemical elements it is similar to Masefield's
poem. It has some of the force and vividness
of Davidson's treatment, but lacks the unity of
tone and felicity of phrase both of Davidson and
of Masefield. The concluding stanzas show, how-
ever, that Vines has utilized science in an
interesting manner.

1 Untermeyer's Modern British Poetry, Rev. Ed. p. 348
Sometimes yet you snigger when you think
Me dead; you think you have me
Sulphur, calcium, gas and earth,
Debauched by homesickness for
The original mud.
I fool you; out of my tunnel oblivion
Like a flashing express
I rush into birth, terribly shrieking
With laughter.

I am eternal life,
Though you chased and ate me
In the beginning,
Latterly preached at me mortal dogma,
I am the resurrection
All your scientific
Cosmic apparatus
Cannot dissect me, all your fuss
Misses my point.
For I am a paradox, practical joke
Of the ancient of Days.
Everything and Nothing. 1

Although a minor group, the Sitwells and their associates have made some distinctive adaptations of science to poetry. Even when following general trends in utilizing science, they have frequently been a little more daring in their figures of speech—sometimes more daring, indeed, than poetic as in the case of "stalactites." On the other hand, the Fifth Philosopher's Song and Elan Vital compare favorably in form and thought with the work of other minor contemporary poets; certainly they are

1 Wheels, 1919, p. 67
more poetic and meaningful than a poem like Graves's *Marmosite's Miscellany*.

Some likenesses between other poets here considered and the Sitwell group have been pointed out. Another common characteristic, a more indefinable one remains. We have seen that the term "spinning earth,"—and among the three Sitwells—"stalactites" have become poetic commonplaces. Several other words, often of less certain scientific origin, occur again and again with figurative meaning in the poetry of The Georgians; Sitwells and others. Such words as dissect, filter, focus, distil, compound, satellite, eclipse, fungus, whorl, and meridian are a part of common speech largely because of scientific influence. Proof is lacking, but it is natural to assume that the constant use of such terms among scientists,—terms that now also have non-technical meanings—has reinforced their connotative value for poet and reader. Most of the words mentioned above have been in the language far centuries in specific as well
as figurative meanings. Only a few of them can be traced directly to a scientific origin, but several have interesting histories. In 1611 Kepler introduced the term "satellite" to describe the planets discovered by Galileo revolving about Jupiter. But before this it had been used with its meaning of guard or attendant. When the poet now employs the word figuratively, does he think of the original or the astronomical meaning? Kepler receives credit, also, for using "focus," in 1604, with its meaning in geometry, apparently from analogy with its use in optics; however, the latter use is not recorded in English until 1685. "Whorl" is variously defined; in general it signifies a wheeling movement, and was a botanical term as early as 1551 but was not used in anatomy until 1829. So with most of these words classified as common terms, the non-scientific meanings existed before their adaptation for technical purposes. In using such words "dissect," "distil," "filter," and "fungus," the

Note:
The New English Dictionary is the authority given for the dates of usage and histories of words.
poet may have in mind a common meaning or a scientific one. It seems probable, however, that science has given such words greater significance for both poet and reader.

Our survey has shown that astronomy has furnished by far the greatest amount of poetical material and that many allusions and figures are based upon conceptions that are comparatively old, such as the earth's rotation and the moon's effect upon the tide. Since the perfecting of new and more powerful instruments, much has been added to our knowledge concerning the vastness of the starry systems. This has been the most significant recent information utilized by the poets, save that in Noyes's Watchers of the Sky, for he alone has gone far beyond Tennyson's astronomy. Theories regarding the origin and development of the earth reflected in the poetry of 1910 to 1925 also differ little from those found in Tennyson and Davidson. Less attention is paid to biological aspects of evolution than by poets of the late nineteenth century. Present day biological thought appears in three unusual
poems, one by a great modern poet, Masefield; another by an important member of a minor radical group, Aldous Huxley; and the third by a very obscure poet, Sherard Vines. However, Davidson's *Anthropological Theology* antedates some of the allusions made by these three poets. Physics and chemistry are almost wholly neglected, and references to botany are few indeed, with nothing in any way comparable to Erasmus Darwin's *Botanic Garden*.

Of greater significance than the newness or variety of scientific material utilized is the fact that the references are largely incidental to the real subject matter of the poems in which they appear. In other words, scientific knowledge, particularly of astronomy, is used chiefly to explain or make more vivid the meaning of things non-scientific. Erasmus Darwin, on the contrary, thought it necessary to interpret unknown botany in terms of conventional poetic figures. Frequently these twentieth century poets do use
science as subject matter, sometimes with a purely descriptive handling, sometimes with a philosophic meaning as in Squires's *The Moon* or Vines's *Elan Vital*. More often, however, the references are illustrative and figurative. Wherever used, the figures for the most part are not strained and distorted—those in the *Bitwell* poetry excepted—but add to the effectiveness of description or interpretation, fitting naturally into the general tone of a particular poem, just as *Tennyson*’s figures do.

While some ideas, like "the spinning of the earth," are common to most of the poets here discussed, and with many of them scientific reference is very occasional, a few writers show a decided interest in science. Among these are Drinkwater, Stephens, Graves, Nichols, Squire, and Monro. Others are remembered chiefly for particular poems: Freeman for the *Evening Sky*, Vines for *Elan Vital*, Binyon for *The Sirens*, and Rosenberg for *The Jew*. Masefield, Huxley, and Edith and Osbert Sitwell, although having
no very general enthusiasm for science, have contributed more to this study than a single significant poem. Noyes, of course, through the Torchbearers out-tops his contemporaries in use of scientific knowledge. What has just been said should make clear that the naturalization of science for poetic purpose is peculiar to no one group. True, several of these poets are minor; "But," as Professor Lowes of Harvard says, "it's the nobodies of poetry, even to-day, who are the straws that show the way the wind is blowing."

On the other hand, several major figures in contemporary poetry are included among those drawing upon science. The observations which have been made in this study, then, seem to be representative of general tendencies in British poetry to-day.

Why other poets, like Davies, Thomas, Sassoon, de la Mare, and the Irish poets (excepting Stephens) are free from these tendencies can be partially determined. Davies, Thomas, de la Mare, and to some extent Hodgson, are distinguished for having

1 Lowes's Convention and Revolt in Poetry, p. 209
written more than well in a limited field and are chiefly lyrical, singing of simple objects and simple emotions, of love for English flowers, and children, and animals. Masefield and Gibson, too, it will be remembered, have turned to nature and the lives of the humble for their themes. The Irish poets—Yeats, A.E., Colum,—have found their inspiration in Irish legend and in mysticism. Since there has been such a decided movement in modern British poetry away from the complexities of our civilization, we can understand why a great number of learned and technical terms have not entered the poetry of today. Perhaps it is more surprising that so much of the Tennysonian diction remains.

The assimilation of science has also been checked by the fact that several modern poets have not had the formal schooling that characterized most of the nineteenth century writers. Davies was a tramp and pedlar before he gained literary recognition; Masefield went to sea as a boy and later became a wanderer, working in various menial
positions; when de la Mare was seventeen, he became a clerk in an oil company; A.E., after a short study of painting, took a position as accountant in a drapery house. Among those who received a more conventional education we find several who have a decided interest in science—Monro, Noyes, Graves, and Squire. In college these men showed literary inclinations; yet they must have come somewhat into contact with scientific studies. On the other hand, Robert Bridges, for years a successful physician, ignores science in his poetry, whereas Stephens, whose schooling was very limited, and Drinkwater, whose training after high school education was in an insurance company, both make considerable use of astronomy. In general, though, our present day poets are not scholars to be compared with Tennyson, Arnold, and Meredith.

But no examination of general movements or of the scholastic training of poets can altogether answer the question why some poets employ and some ignore science. There still remains the vexing problem whether, or to what degree, science has
a place in verse. Regardless of theory, it is evident from this survey that poets today are only continuing in the tradition which Milton and Tennyson followed. Since little more scientific knowledge is now being utilized than appears in Tennyson, we may be correct in assuming that it was he who set the immediate precedent for contemporary poets. Their use of science is so natural that, excepting Noyes, they seem to feel that it requires no defense.

Earlier, however, Erasmus Darwin had felt apologetic about his attempt to combine poetry and botany. He begins by showing how prose and poetry differ: "next to the measure of the language," he holds that the distinction lies in the fact that poetry allows fewer terms for abstract ideas, whereas prose contains such words. If by prose he means scientific prose, his explanation is open to objection. Certain it is that he made greater use of abstract terms while describing the supposed emotions of plants than a botanical explanation of the same phenomena would have in-
cluded. Despite what his versification of botany would seem to prove, he asserts that, in general, prose is a better medium for science than poetry. Evidently, he was fully aware that what he planned was merely an experiment in verse, concluding; "nevertheless science is best delivered in prose, as its mode of reasoning is from stricter analogies than metaphors or similes." Most of us will agree that prose is far better employed if the writer's sole purpose is to teach scientific facts.

Alfred Noyes had a different purpose—not alone to increase man's admiration for astronomical discoveries but also to increase his faith in God. Scientific progress, he maintains, has its own epic unity, and, through its interest to humanity, belongs to the creative imagination of poetry. While we may question his power to realize such epic treatment, we see no reason why the theme is any less poetic than Lucretius's in De Rerum Natura or Milton's in Paradise Lost. Since science is so limited that it cannot "attempt a post-Copernican

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1 E. Darwin's Poetical Works, Vol. 2, pp. 63-64
justification of the ways of God to men," Noyes argues that it is left to poetry to do so. Furthermore, "Even if science and poetry were as deadly opposites as the shallow often affirm, the method and scheme indicated above would at least make it possible to convey something of the splendour of the long battle for the light in its most human aspect."

Noyes is attempting in the Torchbearers to meet a criticism made a hundred years before by Shelley—a criticism which stands as true as when first uttered. In A Defense of Poetry Shelley points out that scientific knowledge had outstripped "the creative faculty to imagine that which we know . . . The cultivation of those sciences which have enlarged the limits of the empire of man over the external world, has, for want of the poetical faculty proportionately circumscribed those of the external world, and man, having enslaved the elements, remains himself a slave." Since Shelley wrote this indictment,

\[\text{Noyes's Watchers of the Sky, p. ix}\]

\[\text{Shelley's A Defense of Poetry quoted in The Prelude to Poetry, p. 234}\]
certain poets, notably Tennyson, have tried to relate imaginatively man's emotions to this great mass of knowledge. At the present time, besides Noyes, the Belgian poet Maeterlinck has been making a similar attempt. "It is perhaps the pivotal merit of M. Maeterlinck's book Magic of the Stars," asserts Gilbert Thomas in the Bookman, "that it is calculated to drive vitally home even to the dullest mind the fact that there are more things in heaven and earth than are dreamed of in the average philosophy, and that, in the light of present data, a mechanistic theory of the universe is untenable." If, keeping their high aims before them, they can also bring high imaginative powers to bear upon their subject matter, Maeterlinck and Noyes need no defense for having used scientific knowledge as their medium. We are still far from being able "to imagine that which we know."

When science enters poetry, not as subject matter but in allusions and figures of speech, the question raised is one of poetical diction. Wordsworth's well known theory touches upon this point.

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1 The Poetry of Science by Gilbert Thomas in Bookman, June 1930, pp. 196-7
directly and indirectly. In choosing the "language really used by men," Wordsworth proposed to disregard so-called poetic diction, thereby eliminating personifications of abstract ideas, which occur frequently in ordinary speech. To him the distinction between the actual words of prose and poetry is not great; the difference lies in the imaginative coloring given them by the poet. Whether or not scientific terms will be a part of the poet's diction, he believes, depends upon the degree of their assimilation in the "language really used by men;" but, if the scientist effects a revolution "in the impressions which we habitually receive," the poet will not lag behind him. "The remotest discoveries of the Chemist, the Botanist, or Mineralogist, will be as proper objects of the Poet's art as any upon which it can be employed, if the time should ever come when these things shall be familiar to us, and the relations under which they are contemplated by the followers of these respective sciences shall be manifestly and palpably material to us as en-

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Joying and suffering beings:"

Most of the twentieth century poets here considered seem to agree in practice with Wordsworth's belief that poetic diction does not differ greatly from prose diction, though possibly mythological allusions occur with more frequency in poetry than in prose. Gibson and Masefield even follow the Wordsworthian theory more closely, in keeping their language near the speech of the humble classes. Few of these contemporary poets in using technical terms go beyond the average reader's comprehension. Contrary to Wordsworth's dictum, "personifications of abstract ideas" occur frequently in modern poetry, some of them drawn from scientific knowledge. Figures of speech are very extensively used, but many are merely descriptions of objects rather than personifications. These figures from science range in effectiveness from Edith Sitwell's "stalactites of boredom" to Noyes's grain of truth "packed, like radium, with whole worlds of light."

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1 Wordsworth's Preface and Essays on Poetry, p. 19
Whether scientific ideas are proper for poetic use is most severely tested by the qualification, "when they shall be manifestly and palpably material to us as enjoying and suffering beings." With Wordsworth Professor Lowes of Harvard decidedly agrees, for he considers scientific knowledge to be in a constant state of change, not at all stabilized. "The sections of In Memoriam that deal with evolution," he declares, "were antiquated while Tennyson was yet alive; and the contemporary science in Dante, and Chaucer, and Ben Jonson, and Milton is a stone of stumbling and a rock of offence, except to those of us whom its elucidation helps to live. So long as a scientific textbook is obsolete in a decade or less, to poetize science is to court mortality. Wordsworth was absolutely right."

If Einstein's theory comes into general acceptance, we can see, according to this view, how Harold Monro, among many others, has courted mortality. Gravity as an actual force, which Monro

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1 Lowes's Convention and Revolt in Poetry, p. 298
worships so ardently, Einstein declares does not exist; its apparent effect is due to an altogether different cause. Possibly, even so, since the term is so much in popular use, it will remain as descriptive of this apparent force, just as we still speak of the sun moving from east to west when we know otherwise. After all, only the universal characteristics of human nature do remain constant in this changing world, and the trappings of clothes, manners, ideas, grow old and are cast off to be replaced by new ones. If we discard the whole because a part is obsolete, what will become of Macbeth with its ghosts and witches, of Homer with his pagan gods, or of Paradise Lost with its sulphurous hell? Tennyson's ideas of evolution may have been amiss, yet by imaginatively recording their effect upon an individual, he may reveal something of human nature. Scientific facts in themselves, as Arnold insists, do not have great power of satisfying our demand for

1 Encyclopedia Britannica, 14 ed., V. 19, p. 95.
2 Arnold’s Literature and Science in Snyder and Martin’s Book of English Literature, pp. 709-720
beauty and right conduct. Yet they may be so interpreted as to relate them to our emotions. Ideas, not absolute truth, are the mainsprings of our feelings and conduct. On the other hand, there is this to consider—a "science-conscious" public may demand even greater adherence to accepted facts (as in the case of Graves's monkey!) and more and more reject what does not satisfy truth as the scientists know it. From the persistence in poetry of the ancient theory of planetary music and the continued appreciation of Paradise Lost, it seems that such a time has not yet arrived.

"When they shall be manifestly and palpably material to us as enjoying and suffering beings" implies more than mere truth or age of an idea or a term; it suggests a very fundamental characteristic of poetic diction, intelligibility.

(Apropos of this, Professor Lowe relates the anecdote of Charles Lamb's reading to his sister the first line of one of Wordsworth's poems, "What is good for a bootless bene?" and her quick
Much technical information which is said to die because it is untrue, more probably sinks into oblivion merely because it is not understood. The examples which we have noted, for the most part do not violate the rule of intelligibility in word usage. A word or idea in its literal meaning may be clear, however, and yet be unintelligible in its figurative use, for instance, Edith Sitwell's "stalactite." Furthermore, as Professor Lowes points out, any word, whether scientific or non-scientific, must be the right word for what the poet wishes to express and must fit into the context. Since upon this criterion rests so much of poetic merit, we can rarely judge a particular word in a given passage. We have already remarked, in fact, the naturalness with which scientific references occur in the examples from modern poetry. Hence, to choose a particular allusion that mars the unity of a poem or does not fit the context would be most

1 Lowes's *Convention and Revolt in Poetry*, p. 264
difficult. At least, scientific terms are not conspicuous intruders in present day poetry.

Not only must discoveries be "material" to us, according to Wordsworth, but they must also be "material to us as enjoying and suffering beings." Many scientific terms cannot meet this last condition. The scientist labors to cut away all meanings save one from the term he wishes to employ; the more exact he can make the meaning the better. The poet, on the other hand, makes capital of words that have associative and emotional value for his readers. "Until objects have become part and parcel of the loves, and hates, and hopes, and fears of men, they are not plastic stuff for art to work with." Therein probably lies the explanation of why contemporary poets have not borrowed more generously from chemistry and physics; most of the terms are too technical to have connotative value. We have already built up many associations about astronomical terms and concepts; and we find references to these appear-

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1 Lowes's Convention and Revolt in Poetry, p. 297
ing with great frequency in modern poetry. Through long familiarity with the idea of the rotation of the earth, we derive more than an intellectual meaning from the phrase "the spinning earth."
The "nobodies" of present day poetry may, in time, help build up association values for terms like electron, periodic tables, and valence. A scientific idea may be intelligible, in keeping with the context, and yet fail in being very effective if it does not stir the imagination as well as the intellect.

Edwin Markham warns the poet to avoid "the scientifically exact," no doubt having in mind words that lack connotative value, yet the term that is "scientifically exact" to the scientist may mean something more to the poet. Thus words like star, and nebula and atom, even when used correctly in a technical sense, may be charged with imaginative force for the poet. The "scientifically exact," like the historically exact, has its place in poetry provided the poet keeps his freedom of creative power. And a genius, dis-

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regarding Wordsworth's principles, may through its context endow a word lacking in connotative value with imaginative force. To quote Professor Lowes again: "Words in themselves, then, are neither poetic or unpoetic. They become poetic, or they remain unassimilated prose, according as the poet's imaginative energy is or is not sufficiently powerful to absorb them."

As long as the poet sees scientific concepts profoundly disturbing men's thought and feelings, he may look to them for material through which he may interpret life. As long as he can draw from the language intelligible to his readers scientific ideas, and terms that have power to quicken men's emotions, he may well enrich his vocabulary and figures of speech from science. In practice Wordsworth's theory of scientific diction in poetry has proved its worth.

The naturalization of science suggested by Pater was well begun by Tennyson and has continued in the twentieth century, not so much in extending

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1 Lowes's Convention and Revolt in Poetry, p. 193
its range as in giving greater connotative value to expressions already used. Though physics and chemistry, and to some extent, biology, remain largely unnaturalized as in Pater's day, here and there are indications that the process of assimilation is still going on among modern British poets.
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