

Science From an Easy Chair

(By Sir Ray Lankester, K.C.B., F.R.S.)

To what jewel or precious stone was Shakespeare alluding when he makes the exiled Duke in "As You Like It" (after praising his rough life in the forest of Arden, and declaring that adversity has its compensations), exclaim:

"The toad, ugly and venomous,
Wears yet a precious jewel in his head?"

No doubt the unprejudiced reader supposes when he reads this passage that there is some stone or stone-like body in the head of the toad which has a special beauty, or else was believed to possess magical or medicinal properties. And it is probable that Shakespeare himself did suppose that such a stone existed. As a matter of fact, there is no stone or "jewel" of any kind in the head of the common toad nor of any species of toad—common or rare. This is a simple and certain result of the careful examination of the heads of innumerable toads, and is not merely "common knowledge," but actually the last word of the scientific expert. In these days of "nature-study" writers familiar with toads and frogs and kindred beasts have puzzled over Shakespeare's words, and suggested that he really referring to the beautiful eyes of the toad, which are like gems in colour and brilliance.

This, however, is not the case. Shakespeare himself was simply making use of what was considered to be "common knowledge" in his day when he made the Duke compare adversity to the toad with a magic jewel in its head, commonly known as "a toad-stone," although that "common knowledge" was really not knowledge at all, but—like an enormous mass of the accepted current statements in those times, about animals, plants, and stones—was an absolutely baseless invention. Such baseless beliefs were due to the perfectly innocent but reckless habit of mankind, throughout long ages, of exaggerating and building up marvelous narrations on the one hand and on the other of believing without any sufficient inquiry, and with delight and enthusiasm, such marvelous narrations recorded by others. Each writer or "gossip" concerning the wonders of unexplored nature, consciously or unconsciously, added a little to the story as received by him, and so the authoritative statements grew more and more astonishing and interesting.

It was not until the time of Shakespeare himself that another spirit began to assert itself—namely, that of asking whether a prevalent belief or tradition is actually a true statement of fact, and of proceeding to test the belief by an examination of the thing in question, and not by merely adducing the assertions of "the learned so-and-so," or of "the ingenious Mr. Dash." This spirit of inquiry actually existed in a fairly active state among the more cultivated of the Greeks. Aristotle (who flourished about 350 B.C.), though he could not free himself altogether from the primitive tendency to accept the marvellous as true because it is marvellous, and without regard to its improbability, yet on the whole, showed a determination to investigate, and to see things for himself, and left in his writings an immense series of first-rate original observations. He had far more of the modern scientific spirit than had the innumerable credulous writers of Western Europe who lived fifteen hundred to two thousand years after him. Even that delightful person Herodotus, who preceded Aristotle by a hundred years, occasionally took the trouble to inquire into some of the wonders he had heard of on his travels, and is careful to say, now and then, that he does not believe what he heard. But the mediaeval-makers of "bestiaries," herbals, and treatises on stones which were collections of every possible fancy and "old-wives' tale" about animals, plants, and minerals, mixed up with Greek and Arabic legends, and the mystical medical lore of the "Physiologus," that Byzantine Cyclopaedia of "wisdom while you wait"—deliberately discarded all attempt to set down the truth; they simply gave that up as a bad job, and recorded every strange story, property, and "application" (as they termed it) of natural objects, with solemn assurance, adding a bit of their own invention to the gathered and growing mass of preposterous misunderstanding and superstition. In the seventeenth century the opposition to this method of omnivorous credulity (which even today, in spite of all our "progress," flourishes among both the rich and the poor) crystallized in the purpose of the Royal Society of London for the promotion of Natural Knowledge—whose motto was, and is, "Nullius in verba" (that is, "We accept no man's bare assertion,") and whose original first rule, to be observed at all its meetings, was that no one should discourse of his opinions or narrate a marvel, but that any member who wished to address the society should "bring in" that is to say, "exhibit" an experiment or an actual specimen. A new spirit, the "scientific spirit," produced and was nourished by this and similar societies of learned men. As a consequence the absurdities and the cruel and injurious beliefs of witchcraft, astrology, and baseless legend melted away like clouds before the rising sun. In the place of the mad nightmare of fantastic ignorance, there grew up the solid body of unassailable knowledge of Nature, and of man, which we call "science"—a growth which made such prodigious strides in the last century that we now may be truly said to live in the presence of a new heaven and a new earth!

It was, then, a real "stone," called the toad-stone, to which Shakespeare alluded. It is mentioned in various old treatises concerning the magical and medicinal properties of gems

and stones, under its Latin name, "Bufonius laevis," and was also called Borax, Nosa, Crapandinus, Crapaudina, Chelonitis, and Batrachites. It was also called Grateriano and Garatronius, after a gentleman named Gratterus, who in 1473 found a very large one, reputed to have a marvellous power. In 1657, in the "translation by a person of quality," of the "Thaumatrographia" of a Polish physician named Jonstonus, we find written of it: "Toads produce a stone, with their own image sometimes. It hath very great force against malignant tumors that are venomous. They are used to heat it in a bag, and to lay it hot, without anything between, to the naked body, and to rub the affected place with it. They say it prevails against the enchantments of witches, especially for women and children bewitched. So soon as you apply it to one bewitched, it sweats many drops. In the plague it is laid to the heart to strengthen it." Another physician of the same period, appears to be affected by the old traditions about the stone and how he tested them. He says it was reported that the stone could be cut out of the toad's head. (In the book called "Hortus Sanitatis," dated 1490, there is a picture, now before me, of a gentleman performing this operation successfully on a gigantic toad.) Our sceptical physician, however, goes on to say that it was commonly believed that these stones are thrown out of the mouth by old toads (probably the tongue was mistaken for the stone), and that if toads are placed on a piece of red cloth they will eject their "toad-stones," but rapidly swallow them again before one can seize the precious gem! He says that when he was a boy he procured an aged toad and placed it on a red cloth, in order to obtain possession of "the stone." He sat up watching the toad all night, but the toad did not eject anything. "Since that time," he says, "I have always regarded as humbug ('badineries') all that they relate of the toad-stone and its origin." He then describes the actual stone which passes as the toad-stone, or Bufonius laevis, and says that it is also called batrachite, or brontia, or ombria. His description exactly corresponds with the "toad-stones" which are well-known at the present day in collections of old rings.

I have examined twelve of these rings in the British Museum, through the kindness of Mr. C. H. Read, P.S.A., the Keeper of Mediaeval Antiquities, and four in the Ashmolean Museum at Oxford. Two of these are of chalcedony, with a figure of a toad roughly carved on the stone, and are of a character and origin different from the others. The others, which are the true and recognized "toad-stone," or "laevis Bufonius," are circular, slightly convex "stones," of a drab color, and with a smooth, enamel-like surface. They are platelike discs, being of thin substance and concave on the lower surface, which has an upstanding rim. I recognized them at once as the palatal teeth of a fossil fish called "Lepidotus," common in our white and colourless life, but are stained of various colours according to the nature of the rock in which they are embedded. A drab colour like that of the skin of the common toad is given to them by the iron salts present in many oolitic rocks; those found in the wealden of the Isle of Wight are black. That the "toad-stones" mounted in ancient rings are really the teeth of a fish has been already recorded by the Rev. R. H. Newell ("The Zoology of the English Poets," 1845), but he seems to be mistaken in identifying them with those of the wolf-fish (Anarrhichas). They undoubtedly are the palatal teeth of the fossil extinct ganoid fish Lepidotus.

Before leaving the queer inventions and assertions of the old writers about these fossil teeth, which they declared to be taken out of the toad's head, let me quote one delightful passage from a contemporary of Shakespeare (Lupton, "A thousand notable things of sundry sortes. Whereof some are wonderful, some strange, some pleasant, divers necessary, a great sort profitable, and many very precious," London, 1595). "You shall know," he says, "whether the Toadstone called 'crapaudina' be the right and perfect stone or not. Hold the stone before a toad, so that he may see it. And if it be a right and true stone, the toad will leap towards it and make as though he would snatch it from you; he envieth so much that a man should have that stone. This was credibly told Mizaldus for truth by one of the French King's physicians, which affirmed that he did see the trial thereof."

We have thus before us the actual things called toad-stones, and believed by Shakespeare and his contemporaries to be found in the head of the toad. How did it come about that these pretty little button-like, drab-colored fossil teeth were given such an erroneous history? This question was answered by the late Rev. C. W. King, Fellow of Trinity College, Cambridge, in his book on "Antique Gems" (London, 1860). He says, "I am not aware if any substance of a stony nature is ever now discovered within the head or body of the toad. Probably the whole story originated in the name Batrachites (Frog-stone or Toad-stone), given in Pliny to a gem brought from Coptos, and so-called from its resemblance to that animal in colour." We have not, it must be noted, any specimens of the Toadstone at the present day actually known to have been brought from Coptos. It is quite possible that the fossil fish-tooth was substituted ages ago for Pliny's Batrachites, and was never found at Coptos at all!

Whether that is so or not, the fact is that Pliny never said it came out of a toad, but merely that it was of the colour of a toad.

The Pliny referred to is Pliny the Elder, the celebrated Roman naturalist, who wrote a great treatise on natural history, which we still possess, and died in A. D. 79, whilst visiting the eruption of Vesuvius. He says nothing of the Batrachites being found inside the toad, nor does he mention its medicinal virtues. The name alone—simply the name "Batrachites," the Greek for toadstone—was sufficient to lead the fertile imagination of the mediaeval doctors to invent all the other particulars! It is a case precisely similar to that of the old lady who was credited with having vomited "three black crows." When the report was traced step by step to its source it was found that her nurse had stated that she vomited something as black as a crow!

The belief in the existence of a stone of magical properties in the head of the toad is only one of many instances of beliefs of a closely similar kind which were accepted by Pliny (although he records no such belief as to the toadstone), and were passed on from his treatise on natural history in a more or less muddled form to the middle ages, and so to our own time by later writers. Thus Pliny cites, as stones possessing magical properties, the "Bronte" found in the head of the tortoise, the Cinea in the head of a fish of that name, the Chelomites, grass-green stone found in a swallow's belly, the Draconites, which must be cut out of the head of a live serpent, the Hyaeia from the bowels of the Hyaeia, and the Saurites from the bowels of a green lizard. All these and the Echites, or viper-stone, were credited with extraordinary magical virtues, and many of the assertions of later writers about the toad-stone are clearly due to their having calmly transferred the marvelous stories about other imaginary stones to the imaginary toad-stone. The only stone in the above list which has a real existence is that in the fish's head. Fish have a pair of beautiful translucent stones in their heads—the ear-stones or otoliths—by the laminated structure of which we now can determine the age of a fish just as a tree's age is told by the annual rings of growth in the wood of its stem. The fresh water crayfish has a very curious pair of opaque stones (concretions of carbonate and phosphate of lime) formed in its "stomach" as a normal and regular thing. They are familiar to every student who dissects a crayfish, and I am told that in Germany today, as in old times also, the "krebstein" is regarded by the country-folk as possessed of medicinal and magical properties. I am not able, on the present occasion, to trace out the possible origin of all the stories and beliefs about stones occurring within animals. They are more numerous than those cited by Pliny; they exist in every race and every civilization, and refer to a large variety of animals. Probably many of these beliefs date from prehistoric times. In the East the most celebrated of these stones, since the period of Arabic civilization, is called a Bezoar stone. "Bezoar" is the Persian word for "antidote," and does not apply only to a stone. The true and original "Bezoar stone" of the East is a concretion found in the intestine of the Persian wild goat. Those which I have seen are usually of the size and shape of a pigeon's egg and of a fine mahogany colour, with a smooth, polished surface. The Persian goat's bezoar stone is found, on chemical analysis, to consist of "ellagic acid," an acid allied to gallic acid, the vegetable astringent product which occurs in oakgalls used until lately in the manufacture of ink. The bezoar stone is probably a concretion formed in the intestine from some of the undigested portions of the goat's food. Such concretions are not uncommon, and occur even in man. "Bezoar stones" are obtained in the East from deer, antelope, and even monkeys, as well as goats, and must have a different chemical nature in each case. Minute scrapings from these stones are used as medicine, and their chemical qualities render their use not altogether absurd, though they probably have not any really valuable action. It is probable that their use had a later origin than that of the "stones" connected with magic and witchcraft. Sixteenth century writers knew well to invent a history when their knowledge was defective, declared the bezoar stone to be formed by the inspissated tears of the deer or of the gazelle—the "gum" which Hamlet remarked in aged examples of the human species.

The substance called "ambergris" (grey amber), valued today as a perfume, is a foecal concretion similar to a bezoar stone. It is formed in the intestine of the sperm whale, and contains fragments of the hard parts of these whales. "Hair-balls" are formed in the intestines of various large vegetarian animals—and occasionally stony concretions of various chemical composition are formed in the urinary bladder of various animals, as well as of man. The "eagle-stone" is also a concretion to which magical properties were ascribed. I have seen a specimen, but do not know its history and origin. Glass beads found in prehistoric burial places are called by old writers "adders' eggs" and "adder-stones," and were said (it is improbable that one should say "believed") to hatch out young adders when incubated with sufficiently silly ceremonies and observances. A celebrated "stone" of medicinal reputation in the East is the "Goa-stone." This is a purely artificial product—a mass of the size and shape of a large egg, consisting of some very fine and soft powder like fuller's earth, sweetly scented and overlaid with gold-leaf. A very little is rubbed off, mixed with water, and swallowed, as a remedy for many diseases.

"Mrs. Barkley, are you familiar with 'Songs Without Words'?" "Oh, yes—quite!" Mr. Barkley frequently sings them when he comes home early in the morning.

About the Little Dinner

When most people talk about eating they indulge in a vulgar levity, says the London Daily Telegraph. It is commonly supposed that such a matter as the planning of a menu can be approached with the gay flippancy of a cabinet minister. To this melancholy, fatuous delusion may be traced many ruined homes, the tragedies of many lives of fair promise. A household in which the art of eating is not zealously studied is abnormal, unwholesome and unhealthy. "Tell me what you eat," says the sublime French aphorism, "and I will tell you what you are." Yet there are people who expect you to reverence their great souls when they assure you that they don't know what they're eating—it is all one to them. Of course, you will generally be right to believe they are lying. If not, award them the proper compassion earned by the half, the maimed and the blind. If a poor creature really does find all food taste alike he is no better than a person to whom all colours are alike, or for whom music means nothing. The reason why people pretend to be in this wretched condition is the vulgar notion that it is not spiritual or not intellectual to be interested in your dinner. Hence households where they want to be cultured at all costs treat the menu as a thing that anyone can make in a moment. There is, of course, another extreme. It is possible to elaborate and over-elaborate, to pile course upon course, till the dinner is only fit for some bloated giant of the First Empire. But there is not much danger of such horrors nowadays. For years taste has been turning towards simplicity. Look at the menus of fifty years ago. In one—not a banquet of any special occasion, but a chance day's dinner at a table in St. James' of excellent reputation—there are six entrees, saddle of mutton and pigeons. No separate course of vegetables appears. The sweets are many and of appalling solidity. We do not do things in that fashion nowadays. Compare with it the menu of a Parisian dinner in our time. The occasion was of some importance, and, moreover, the Christmas season might well have induced a prodigality of courses. But these were all:

Potage poule au pot Henry IV.
Merlans a la Bretonne.
Chapons du Man rotis.
Ragout de Truffes.
Fonds d'Artichaut demi-glace
Bombe Chantilly.

It is an illustration of the modern principle that at dinner you ought not to taste an interminable succession of courses, but to eat heartily of a few.

"A Plain Leg of Mutton"

There were certainly giants in the old days. Our capacity is far below theirs. The simplest family dinner, in the days when Michael Angelo Titmarsh wrote dithyrambic pages about them, groaned beneath a profusion of heavy dishes, which would suffice the modest appetites of our suburbs for a week. But already the symptoms of change were plain to the discerning eye. It was the same Titmarsh who sang the hymn of the simple life:

A plain leg of mutton, my Lucy,
I pray thee, get ready at three.
Be it smoking and tender and juicy,
And what better meat can there be?

Few of us now dine at three. But a good many of us are not ashamed to profess our preference of the "plain leg of mutton," or some similar innocent dish, over all the refinements in the world.

"Soup, fish and roast," said one of the great modern maitres d'hôtel, "make dinner enough for an emperor." It is not to be taken too literally, for your maitre d'hôtel, like other great artists, is fond of talking paradox. Doubtless he would add to his ideal dinner of three courses several little matters of vegetables and sweets to clothe the austere dignity of its form. He would probably decorate it for the taste of the general with an entree or two. But the mere fact that the modern academicians of the art of the kitchen talk in this strain shows that gourmandize is out of date. The gourmand has yielded to the gourmet. It is a far cry to the time when the skilled epicure could detect three appetites during the dinner—the first a brutal appetite which would devour anything with enthusiasm, the second an appetite less impatient but not less keen, which demanded delicacies; the third an appetite which had to be excited and titillated by piquancy and novelty. We enjoy simpler emotions. But it would be foolish to argue that we enjoy them less. There is an old story of a briefless barrister, who, wishing to propitiate a wealthy epicure, gave him a dinner of mutton chops grilled before a sitting room fire, plain boiled potatoes and beer; and at the end the epicure confessed, with pathos in his voice, that he had never known so alluring a meal. The change of taste in the last half-century has followed the moral of that virtuous tale. Yet the simplest dinner boasts a variety unknown to the great days of old. We have at least begun to understand the importance of vegetables. They rank now with the greatest delicacies of fish, flesh and fowl. We command countless treasures of fruit, once unknown to any but the wealthiest table, and there held in small honour. And naturally we are far less carnivorous than of old.

The Sedentary Life

No doubt a part of this change is to be ascribed to the sedentary habit of modern life. Men chained down in the middle of big towns can only endure a diet of rich and heavy meals at peril of their health. The discovery has

been made tardily, but the results of it are in evidence on all hands. Men who work in an office no longer take a large, solid midday dinner. The thought of that high-principled gentleman of Sam Weller's acquaintance, who, in the early hours of afternoon, used to make a hearty meal off the joint, and top it with a dozen crumpets, afflicts our generation with the nightmare. How did they manage in the brave days of old? Was any work done after the orgy at midday? Some people declare that in those days everybody could afford to doze the afternoon away. But it is probable that the real explanation lies in longer hours. Just as the modern German is at his office a good deal earlier than the Englishman, and leaves it later, but has a large break in the middle of his day, such was the manner of the Victorians. We like to have more time at home, more time for sport, for amusement, and so we cannot afford to spend many minutes on midday refection. A short interval means less food. We must have something which gives our sedentary digestions no trouble, on pain of inefficiency all through the afternoon. The light lunch has become as characteristic of the workaday world of modern London as the hatless head. Not so long ago, if a man had no stomach for chop or steak or a cut off the joint, he must needs put up with a sandwich or bread and cheese. Then, the beginning of a new era, came a time when he could get a scone or a bun, or even a boiled egg. Now the carte of the tea shop provides him with viandes froides assorties worthy of a good restaurant, a little army of entrees to choose from, and soup and fish and vegetables. The lunch of one or two light dishes of this kind is the fashion of today. No doubt it has its dangers. You may see far too many young people trying to live on bread and pastry and tea. But those whose business it is to watch and aid in the development of public taste will tell you that there is far less of this error than of old. The lads who used to support life on a scone and butter now have soup and an apple dumpling, or fish, or an egg, or a neat little portion of an entree. This change of diet is among the most sensible examples of food reform which one can easily find. Some of us will like it none the worse because it is not the result of fanatical advocacy, but of common-sense and commercial enterprise. Whatever we may choose to think about that, it is interesting to note the variety of the fare which awaits the choice of the modern city worker. You may look round the marble tables, and find hardly two people eating the same sort of food. Once upon a time, if they did not choose to have chops, they must have had steak. So by degrees we learn how to live.

THE AEROPLANE DANCE.

There exists in Paris an academy of dancing masters, learned gentlemen who have the whole history of the terpsichorean art at their finger-tips, and who know everything there is to be known about dancing and dancers. They want to see established in Paris a Conservatoire of Dancing, just as there is a Conservatoire of Music. So far their efforts in this direction have not been successful; but they do not despair. Meanwhile, they devote themselves to reviving antique dances and inventing new ones.

The latest effort, due to Professor Lefort, is the "aeronette," a freak dance, suggested by that most topical of things, the aeroplane. It should make for hilarity, wherever it is danced this winter, involving, as it does, a quickest imitation of the starting of the motor, arm-wagging and arm-fluttering for the flight, and ending with the descent, which the dancers express by stamping their feet and lowering their head.

While on the subject of dancing, we might add that a leading feature of the Coliseum is Milla Ida Rubenstein, who also has more or less directly from Russia. This lady is now giving her Dance of the Seven Veils, which created such a sensation recently at the Chatelet Theatre in Paris—where they are judges of dancing. When the turn begins, the lady is wearing seven veils, and at the conclusion of each dance she removes one of the veils till she gets down to the limit, or thereabouts. The writer did not have the advantage of seeing this dance in Paris, but can quite imagine that the French ideas of the limit, and ours, would be rather different, and the Coliseum is, above all, a family house. So that here, at least, spectators will get nothing but grace and beauty; and if there are any other features in the dance that add to its sensationalism, they are not likely to be seen in this country. Of course, Parisian taste is different from our own, and even the Salome dancers over there have been known to shorten their London costumes by a head or two, in order not to seem prudish.

CHAPTER AND VERSE FOR IT.

The story goes that a certain college president in Indiana, a clergyman, was addressing his students at the beginning of the college year.

He observed to them that it was a "matter of congratulation to all the friends of the college that the year had opened with the largest freshman class in its history."

Then, without a pause, says Lippincott's Magazine, the good man turned to the lesson for the day, the Third Psalm, and began to read in a loud voice:—

"Lord, how are they increased that trouble me!"

Sir

Theodore Martin, the lawyer was born in that educated at the High School. Like his friend and elder brother, he was "bred to the law." Aytoun followed the path of his father, and after achieving success and a fortune, it was in 1840 that he set up as a Parliar the hundreds of business sulted the firm of Martin only a few have known it was a famous man of letters of his days Theodore hard at his legal business was able to write of him "a long and very crowded ature has occupied the may say of this portion himself said of Aytoun, his legal practice was of him a power of masterful cal and other questions, service to him at a later ing for the translator of knowledge of affairs who to the biographer of the

Verses and T

At the same time, T mor and versifying power his profession and he and that followed his coming in Tait's Magazine and parodies afterwards. Rabelaisian name of "Bo editions of this admirable between 1845 and 1902. afterwards worked together of Goethe's Poems lished it in 1858. Nine friendship had been severed Martin produced which contains many of their literary collabora name had become well tions. "He was popular great friend of Thacker of the generation. He ent actress Miss Helen prepared a translation of Rene's Daughter"; and in the well-worn path of by so many translators of the "Odes" and critical followed in 1879, in the Classics for English Re two were, in a sense, the addition of a verse tran and Epistles, in a com tion. But only a year ance of the "Odes," the the field with a version tervals during later years lations of "Faust," of se and of Dante's "Vita N "Faust" has passed into tions.

In all these works the ies are apparent; copious rule, an understanding of They are exceedingly p have a "go" and a mela admiration; they are the words run naturally in use the English language ease. But it would be translations, in the st scholarship of Oxford to the word, or to seek of Horace and Catullus seems to have been Thomas Moore. Conin came as near to Horac ever likely to come; a followed the simple r cult to follow—that a chosen—which shall as respond to a Horatian shall be used uniform odes to which it applies plays for all the Sapphi stanza, for all the Alca every case his aim is t sible to the phrasing as of the original. This is posed to that of Theod us one kind of galloping lis," another for "Natis rhymed couplets for This variety pervades so that the last thing i do is to recall or suggest that difference between read as a whole, and t which the scholar der might, for all the Eng been one and the same, the versions are not t ingly. They are full turns of phrase, and it them that they read n poems than like trans

The Life of the

It was while Theo gaged upon the life of Victoria requested him a very different order of the Prince Consort, posed that he had some Court which suggested but this is an entire n says in the dedicatory ume, he had not been with the Prince Consort friend Sir Arthur Help from outside, with no c those which might bel