THE FIRST PUPILLARY LIGHT REFLEX TEST EVER PERFORMED

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"THE RIB, WHICH THE LORD GOD had taken from man, made he a woman." Thus the Bible describes, in chapter two of Genesis, the creation of Eve. It is not said, as at the end of previous days of creation, "and God saw that it was good." But, there is in the Chicago Art Museum a painting by Paolo Veronese depicting the creation of Eve and, miraculously, showing that at least one attempt was made to test the perfection of this latest and most beautiful of God's creatures. When I first saw this painting it struck me that the Lord, gently holding the left shoulder of Eve with his left arm, seems to cover her right eye and to observe the left which he has probably just uncovered. Stately trees tower behind the Lord and Eve, while Adam is still sleeping on the grass. The face of Eve, however, is directed straight forward and thus is exposed to the bright daylight. The expression on the bearded, dignified face of the Lord reveals intense attention—an ophthalmologist, testing the pupillary light reflex of his patient, might have exactly the same look. Another interpretation of the Lord's gesture could be that he is blessing Eve; however, the position of his hand and the look of his face suggest rather an intensive observation of her eye.

This interpretation flashed through my mind like lightning many years ago and since that time I have been anxious to discover whether Paolo Veronese might have had the opportunity to learn about the pupillary light reflex. Unable to find time to personally study the pertinent literature, I browsed through the Encyclopedias (Americana and Britannica) and, asking for further information, I received very valuable answers from persons interested in the history of art and of medicine, for example, Professor Ernest Haswell and Professor Franz Landsberger, both of Cincinnati, Dr. James E. Lebensohn and Professor Ilza Veith, both of Chicago, and Professor G. Donald O'Malley of Los Angeles.

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FIGURE 1. "THE CREATION OF EVE," BY PAOLO VERONESE.

The first question, of course, was whether at the time of Paolo Veronese the pupillary light reflex might have been known to the medical profession. Dr. Lebensohn kindly informed me that Rhazes of Baghdad, Abu-Bakr Muhammed ibn Zakariyaal Razi (850–932), was the first to note the pupillary reaction to light. Rhazes wrote a diffuse encyclopedia of medicine, *Al-Hawi*, which was condensed into a concise compendium and dedicated to Mansur, a Persian prince—hence the latinized name, *Liber medicinalis ad Almansorem*. This manual, translated into Latin by Andreas Vesalius, was used as a textbook for centuries. In the ninth chapter it is stated that "in the middle of the iris appears a hole which contracts when the light is strong but dilates in obscurity."

Since Andreas Vesalius lived from 1514 to 1564 and Paolo Veronese from 1528 to 1588, it is permissible to assume that the latter might have had the opportunity to learn about the pupillary light reflex.

Andreas Vesalius (1514–64) was born in Brussels, December 31, 1514. After medical studies at Cologne, Paris, Louvain, and Padua, at which latter university he received his doctorate in 1537, he lectured

on anatomy at these and other universities. Vesalius held the Chair at Padua from 1537 to 1554. He made anatomy a living and workable science and was noted for his knowledge of the dissected human body. After five years' experience in teaching students to dissect, he published his great work *De humani corporis fabrica* (1543), which was contrary to Galenical tradition. Vesalius' views brought him much derision and even his old teacher, Jacobus Sylvius, failed to support his brilliant pupil. This caused Vesalius to give up his position and become court physician first to Emperor Charles V and later to Philip II. In the meantime the Chair at Padua was occupied by his former pupil, Gabriello Fallopio. At the death of Fallopio, Vesalius accepted the invitation to return to Padua, but was required by the Inquisition to make a pilgrimage to Jerusalem beforehand and was shipwrecked on the return voyage. He died on the Greek island of Zakynthos (Zante) in 1564.

Paolo Veronese is the name given to Paolo Cagliari or Caliari, Italian painter of the Veronese and Venetian schools, who was born in Verona in 1528. Paolo was at first trained as a stone-carver, but soon took to painting and worked under Antonio Badile, who later became his father-in-law. Paolo worked in Fiesole, Mantua (1552), Castelfranco, and settled in or before 1555 at Venice, where he stayed until about 1563. In 1562, however, he is said to have painted an altar picture in Padua. In 1566 Paolo worked in Verona, returned to Venice around 1570, and in 1575 he went back to Padua. He died in Venice in 1588.

The decisive question is whether Paolo Veronese and Andreas Vesalius ever met. During Vesalius' professorship in Padua, 1537–43, Veronese seems not to have lived there, but he probably painted the high altar of the Santa Giustina Church in Padua about 1562. This was the year when Vesalius' successor in the Chair of Padua, Gabriello Fallopio, died and the University of Padua considered asking Vesalius to succeed himself in the vacated Chair. Vesalius was in Venice in May of 1554, but there is no evidence to support a meeting with Paolo Veronese.

Some of the drawings of the *Fabrica* were done by Vesalius himself; some unknown but great draftsman did the skeletons and "muscle-men," and perhaps J. S. van Calcar did some of the others, although we have no proof of this. Jan Stefan van Calcar did three drawings of skeletons for the *Tabulae anatomicae* of Andreas Vesalius published in 1538, and he may have been one of the group of Titian's students employed to do some of the drawings for the *Fabrica*.

To Dr. O'Malley I owe the following additional information: Renaldo Colombo had been a student of Vesalius at Padua whence he went to Pisa and in 1548 to Rome to spend the rest of his life. It is usually stated that the frontispiece to Colombo's *De re medica*, Venice, 1559, published about a half year after the death of Colombo, was drawn by Paolo Veronese. Therefore, it seems possible to assume some link between Veronese and Vesalius although there are no documents which give active support.

The place and year of the painting of "The Creation of Eve" could not be ascertained. It is said to have been painted around 1570 and could therefore have been before the departure and death of Andreas Vesalius.

There is no question that Paolo Veronese's "Creation of Eve" suggests, if not depicts, the performance of a pupillary light reflex test. The contraction of the pupil during illumination was known in Europe when this picture was painted and the scientist who communicated this knowledge to the Christian world worked during a part of the productive period of Paolo Veronese. Although no personal meeting of Vesalius and Veronese is documented, both lived in cities not far apart by sixteenth-century standards and may even have been in the same place at the same time. Even if they did not meet personally, the pupillary contraction on illumination of the eye was known when "The Creation of Eve" was painted.

DISCUSSION

Dr. C. Wilbur Rucker. Doctor Ascher has devoted much of his paper to the problem of whether the sixteenth-century artist, Paolo Veronese (1528–88), could have known of the reaction of the pupil to light. The evidence that he could have known of it is convincing, for several writers had described it prior to the time of the artist. Doctor Ascher named Rhazes and Vesalius. If he had wished further support, he might have found it in the writings of three others that I discovered after some searching: Leonardo da Vinci (1452–1519), Achillini of Bologna (1463–1512), and Montanus of Padua (1498–1552), all Italians, each of whom described the reaction of the pupil to light before the painting of the picture. In any case, the change in size of the pupil from darkness to light is so obvious to any observant person that it must have been general knowledge.

The crux of the paper, however, lies in the interpretation of a picture painted in about the year 1570. Doctor Ascher has exercised his privilege as an art lover and has read into it a meaning that suits *his* fancy. I, having a different background, do not see in it what he sees, and interpret it according to *my* fancy.

The picture is based on one of the myths of the ancient Semitic tribes that lived in the region around Arabia some three thousand years ago. Among the Semites were the Hebrews, who, about five hundred years or so B.C. recorded some of their folklore. They adopted as part of their tradition the two different stories of creation that appear in the first two chapters of the book of Genesis. The story in the second chapter tells of the Garden of Eden and the creation of Eve.

The picture under discussion represents a sixteenth-century artist's interpretation of the myth of the creation of Eve. At that time the Christians were very literal minded as far as the account of creation was concerned and pictured God in the image of a fatherly patriarch. As the artist left no notes, what he intended God to be doing is pure speculation. It is not likely that he would have conceived of God as creating a woman less than perfect; and consequently, there should have been no need for testing the pupillary reflexes. As far as the position of God's hand is concerned, he could just as well be performing an alternate cover test for strabismus.

The artist was undoubtedly a Roman Catholic because of the time and place in which he lived. Consequently, I asked the opinion of a teacher at a Catholic University, who informed me that God does not appear to him to be bestowing a blessing, but he suggested that perhaps he has just finished molding Eve with his hands and is putting on the finishing touches. If this interpretation of the picture is correct, whether the artist knew about the pupillary light reflex is immaterial.

The merit in Doctor Ascher's paper lies in his brief, scholarly biographies of Rhazes and Vesalius, two physicians of long ago, who contributed to ophthalmology.

DR. DERRICK VAIL. In the March, 1961, number of M.D. there appeared an article, "Eye in Medicine" (page 103). The opening paragraphs are interesting to this discussion.

"When Leonardo da Vinci called the eye the window of the soul he only said the half of it; that remarkable organ is also a barometer of metabolism, an aid to diagnosis, a repository of more superstition and folklore than all the organs put together.

"The eye has been venerated in primitive religions, abused by medicine men and magicians, extolled by poets, used by symbolists the world over including the designer of the Great Seal of the United States government.

"It is undoubtedly the instrument of the most important of the five senses, acting as it does in conjunction with the hand to produce craftsmanship and art, giving man a notion of the universe and an orientation in space."

From time to time in our ophthalmic literature over the years, a discussion on painting from the viewpoint of ophthalmology has appeared. The reading of it is always a refreshing relief from the tedium of our discipline.

It is also a partial down payment of the debt that medicine owes to art

and to artists. The philosophers, wise men, and medical quacks of the Renaissance contributed little beyond dialectic confusion to the advancement of medicine. It was the artists of that period, by their accurate, perceptive, and trained powers of observation of man and nature, who founded the science of anatomy and its ancillaries. In this, their knowledge of the human eye played a prominent part.

We are grateful to Dr. Ascher for giving us a delightful and learned essay that stirs our imagination and tickles our intellect.

After hearing him, I have no doubt that he is correct in his interpretation of Veronese's "The Creation of Eve." He cites chapter and verse in support of his acute observation, even to crossing the "t" and dotting the "i." If we don't agree with him, the burden of proof is on us.

It is a curious picture. Adam, knocked out from the operation, lies sprawling like a drunk in a park. Eve, droopy from her dry-birth, stands with one foot in Adam's side, and a bald-headed fully clothed and bearded God comforts her with one hand on her shoulder, and with the other does something to her right eye, all the while peering intently into her left eye.

He could compassionately be wiping away the woman's first tears. He has been doing this ever since the Creation.

He is certainly not performing a screen test for heterophoria as Dr. Rucker suggests. There is no Hebraic visual test chart in the distance so he is not testing her visual acuity. Besides, having created our first parents in his own image, all of their bodies are perforce perfect.

No. I am convinced that Dr. Ascher is right. Presumably knowing from Vesalius the importance of the pupillary response to light as a sign of consciousness, Veronese may well have seized upon this idea as a symbol of life.

The painting also brings to mind a curious controversy that raged centuries ago, among the philosophers, Sophists, and learned doctors of theology. At the risk of establishing an undeserved and unwanted reputation as a learned OMPHALOLOGIST, nevertheless, I should like to mention that an historic debate, quite similar in character to the famous one about how many angels can stand on the head of a pin, involved all three estates at that time. The question, then hotly argued at interminable length, was: whether Adam and Eve should be painted in sacred art with or without navels.

Another controversial question could be why Adam's organs of reproduction seem to be missing in the picture. If this were true, it would be the end of the world and not its beginning.

The painting then is a combination of realism and symbolism, and as a masterpiece of art is worthy of our respect. As a demonstration of the first test of pupillary light reflex ever performed in the world, sponsored by Dr. Ascher's masterful and convincing logic, it should now be a part of ophthalmologic lore.

DR. ASCHER. I do not think there is much left for me to say except thanks to the discussers for their interest in this modest presentation.

I did not intend to elaborate on the history of the pupillary light reflex. Leonardo da Vinci knew so much about physics, chemistry, physiology; he even knew how man could fly on man-made wings and depicted this beautifully. Only recently have men tried to perform what he had suggested.

The objection that the Lord would not have created anything imperfect is important indeed. I feel that would the Lord have realized that his creations would produce Cain and all the murderers and criminals to follow and finally the atom bomb he might have reconsidered his decision and destroyed mankind before Adam and Eve were able to reproduce.

Very comforting is the suggestion that Paolo Veronese may have shown the creator putting the final touch to the molding of Eve's face.

I am glad that this presentation has provoked so much interest and I thank you very kindly for your discussions.