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HISTOLOGICAL, IMMUNOLOGICAL AND BIOCHEMICAL STUDIES ON THE FLESH AND BLOOD OF THE EUCHARISTIC MIRACLE OF LANCIANO (VII CENTURY)

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Translator's note: This is a strictly literal translation of the original Italian. The title reads "VII secolo" (7th century); the PubMed-indexed English abstract of this same paper reads "8th century". No text has been added, omitted, or paraphrased beyond what is necessary to render idiomatic English.

Ancient Christian tradition has handed down to us that at the beginning of the VII century a monk of the Basilian order, while celebrating Mass in the Church of SS. Legonziano and Damiano in the vicinity of Lanciano (Chieti), doubting the truth contained in the sacred rite, witnessed — with the utmost astonishment, together with the people present — the transformation of the host into flesh and the wine into blood.

Of this event, memory has never been lost through the centuries and historical events (Solaro, 1960 [13]). The miraculous Flesh and Blood, always preserved in Lanciano, were subjected to recognitions in 1574, in 1770, and in 1886. The present recognition was carried out at the Basilica of San Francesco in Lanciano on 18 November 1970 (*).

The Flesh of the Eucharistic miracle of Lanciano is preserved in a silver monstrance of the 18th century of fine workmanship, held between two glass panes. It has a rounded shape with diameters of 55 and 60 mm, a yellow-brown colour with some shading of greater intensity.

(*) I thank the Ecclesiastical Authorities of Lanciano for the commission conferred upon me.

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The tissue lamina appears thinned and extensively lacerated in the central area, owing to retraction of the tissue toward the periphery, where it appears raised in circular folds.

The surface is smooth, never irregularly raised, cracked, or incised.

A diffuse scattering of small white formations is noted throughout — at times very minute, at times millet-seed-sized, often confluent, of soft consistency, detachable, not forming part of the tissue matrix, poorly dispersible in physiological solution (*). Finally, in the marginal zone of the circular tissue lamina, small holes are noted — clear evidence, from antiquity, of the passage of a needle.

The consistency of the tissue is uniformly hard and woody, requiring strong pressure with a blade to remove two very small fragments for subsequent examination.

The Blood of the Eucharistic miracle is contained in an ancient glass chalice, closed with a glass lid of equal material, and appears in the form of 5 fragments of a total weight of 15.85 g, of yellow-brown colour with some whitish speckling. The shape of the fragments is entirely irregular, the surface is rough, variably raised, the consistency uniformly hard, such that only strong pressure of the blade allows a small part to be detached with difficulty. At the bottom of the chalice there is a modest quantity of powder of equally dark brown colour.

The present study, which was carried out between 18 November 1970 and 4 March 1971, is aimed at:

a) to ascertain the histological structure of the hard woody tissue handed down as flesh;

b) to define whether the hardened lapideo-cretaceous substance handed down as blood possesses the characteristics of blood;

c) to establish to which biological species the flesh and blood belong;

d) to determine the blood group in the two tissues;

e) to investigate the protein and mineral components of the blood.

(*) The on-the-spot microscopic examination revealed colonies of hyphomycetes, evidently from contamination.

METHODS OF INVESTIGATION

1) For the histological study of the ancient Flesh of Lanciano, the method of Lenzi (1932 [8]) was employed, which adapts itself to mummified tissues. On microtome sections, obtained with difficulty owing to the extreme hardness of the tissue, the following stainings were carried out: haematoxylin-eosin, Mallory, Van Gieson, the Ignesti method for muscle tissue, and Gomori silver impregnation.

2) For the identification of the Blood, a histological examination was attempted on a small fragment, according to the technique for the Flesh. Furthermore the following were carried out: the microchemical reactions of Teichmann modified by Bertrand for haematin hydrochloride, the Takayama test for haemochromogen, the Burton and Stone test with orthotoluidine for oxidases, and the search for haemoglobin by paper chromatography, according to the technique of Franchini (1966 [4]), modified for this study with the use of the thin layer.

3) To define to which species the ancient Blood and the ancient Flesh of Lanciano belong, very small fragments were macerated in distilled water with micro-Potter. On the elution liquid the zonal precipitation test of Uhlenhuth (1901 [14]) was carried out, difficulties having been encountered with a bilateral immunodiffusion reaction according to Ouchterlony (1958 [10]) owing to the scarce liquid available, insufficient to determine preliminarily the optimal quantities of antigen and antiserum to be implicated in the reaction (Piazzi, 1969 [11]).

4) Concentrating 5 times the elution liquid of the ancient Blood against carbowax in a Colover microdiffuser, an electrophoretic tracing was obtained on cellulose acetate stained with Ponceau S and read with the Cromoscan photometer.

5) The mineral investigations in the elution liquid of the ancient Blood were carried out with the SP 90 Unicam atomic absorption photometer for calcium and magnesium, with the EEL flame photometer for sodium and potassium, with the method of Shales and Shales (1941) for chlorides, with the colorimetric method of Goldman and Fernandez (1968) for phosphorus.

FINDINGS

I. Histological study of the ancient Flesh of Lanciano

The structural profile of the tissue appears notably modified owing to the inability to stain the nuclei and a certain degree of overall homogenisation. However, in the various fields of observation and at the various microtome levels,

the mesodermal nature of the tissue emerges clearly: it is composed of fibres directed in a longitudinal sense (Figs. 1 and 2), but also oblique and frankly transversal, this varied orientation being a datum present in every field of observation (Fig. 3).

The fibres have varying length — always modest, as is evident at the dissociated sites (Fig. 4) — nearly uniform thickness, and always appear gathered in bundles of varying size. In particular, at higher magnifications the fibres reveal a longitudinal fibrillar structure (Figs. 5 and 6), all data that lead to recognition of a striated muscle tissue.

Furthermore, the tissue appears characterised by syncytial unions that the fibres realise through bifurcations and reciprocal end-to-end junctions (Fig. 7), a finding that emerges in every district, as can be deduced from the careful study of the wide-angle view (Fig. 8), and which leads to the diagnosis of myocardial tissue.

The syncytial aggregation of the fibres is a constant, universal aspect of the tissue, at times with transverse bridging connections (Fig. 9), a fact that shows even where the fibres are most densely packed, realising a compact ensemble with interpenetrating elements that hints at a syncytium (Fig. 10).

Finally, a lobule of adipose tissue present in the interstitium of the striated musculature under study (Fig. 11) is traversed by fibres that branch into it, dispersing and exhausting themselves among the lipocytes.

It is also to be noted that in no histological section did there appear elements indicative of impregnation of the tissue by mummifying substances, such as those that were employed in antiquity for the preservation of tissues.

Conclusion (I.): the structural picture emerged from the study of the ancient Flesh of Lanciano presents itself as a striated muscle tissue which, by virtue of the clear, ubiquitous syncytial unions between fibres, is revealed as myocardial tissue.

Contributing to this definition are: the varied orientations that the fibres assume even within a single field of observation (predominantly longitudinal, but also oblique or transversal), the constant syncytial union of the fibres end-to-end, the presence of some transverse connections, and the dispersion of muscle fibres within an interstitial adipose lobule — all facts that contradict the hypothesis of a skeletal musculature.

II. Microscopic examination of the ancient Blood of Lanciano

A very small fragment of the Blood was embedded in paraffin according to the technique of Lenzi (1932 [8]). On microtome sections, with

Fig. 1 — Emat.-Eos. x 200. Veduta istologica di insieme dell'antica Carne che appare costituita da fibre raccolte in fasci a decorso vario (notare la sezione secondo piani diversi).

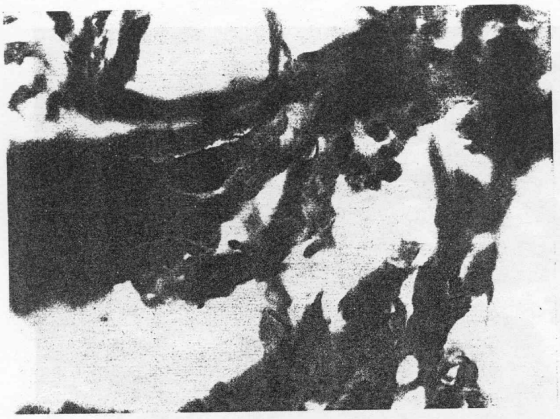


Fig. 2 — Emat.-Eos. x 200. La varia direzione delle fibre, che rivelano sicuri aspetti di fibre muscolari. In questo ed in tutti i successivi fotogrammi i nuclei non sono colorabili.

Fig. 1 — Haem.-Eos. × 200. Overall histological view of the ancient Flesh, which appears constituted by fibres gathered in bundles with a varied course (note the section according to different planes). Fig. 2 — Haem.-Eos. × 200. The varied direction of the fibres, which reveal certain aspects of muscle fibres. In this and in all subsequent photograms the nuclei are not stainable.

Fig. 3 — Metodo di Ignesti x 200. Molto evidente la composizione a fibre muscolari dotate di direzione diversa.

Fig. 4 — Metodo di Ignesti x 200. Le fibre muscolari isolate rivelano, insieme alle loro dimensioni, una chiara striatura longitudinale.

Fig. 3 — Ignesti method × 200. Very evident the composition in muscle fibres endowed with different directions. Fig. 4 — Ignesti method × 200. The isolated muscle fibres reveal, together with their dimensions, a clear longitudinal striation.

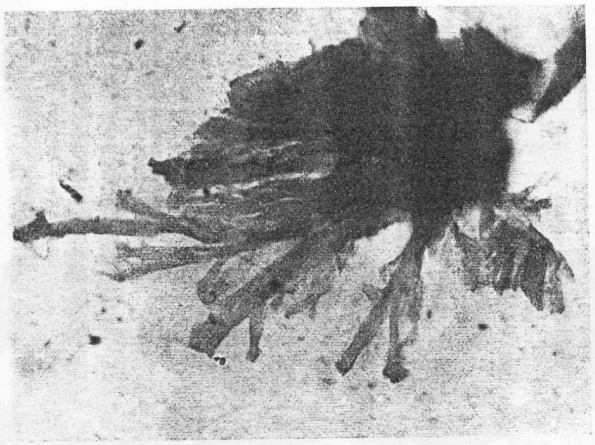


Fig. 5 — Emat.-Eos. x 400. Un piccolo tratto del tessuto isolato e dissociato dalla sezione microtomica. Le fibre evidenziano con chiarezza le fibrille a decorso longitudinale.

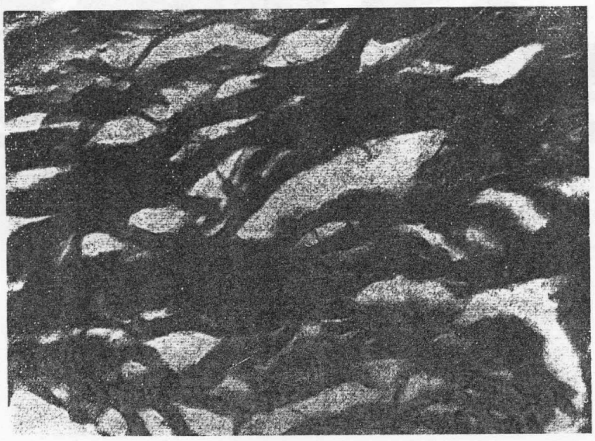


Fig. 6 — Emat.-Eos. x 200. Ancora per dimostrare la composizione in fasci di fibre e la striatura longitudinale.

Fig. 5 — Haem.-Eos. × 400. A small portion of tissue isolated and dissociated from the microtome section. The fibres clearly demonstrate the fibrils with a longitudinal course. Fig. 6 — Haem.-Eos. × 200. Again to demonstrate the composition in bundles of fibres and the longitudinal striation.

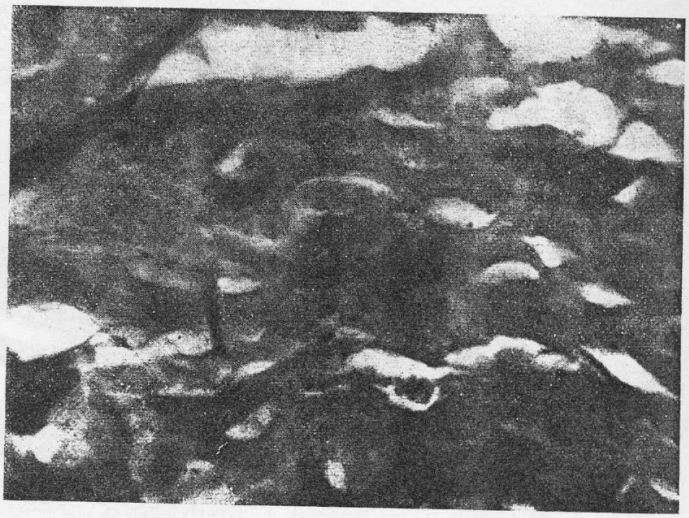


Fig. 7 — Metodo di Ignesti x 400. Si confermano gli aspetti di tessuto muscolare striato le cui fibre, in molte sedi, si innestano reciprocamente per le estremità, dimostrando un aspetto sinciziale.

Fig. 7 — Ignesti method × 400. The aspects of striated muscle tissue are confirmed, whose fibres, in many sites, are grafted reciprocally by their extremities, demonstrating a syncytial aspect.

Fig. 8 — Metodo di Ignesti x 200. Nonostante gli artefatti per l'antica età del tessuto, è evidente la composizione a fibre muscolari isolate o in fasci. In molte sedi le fibre si collegano con quelle contigue per le estremità. Il tipo sinciziale del tessuto emerge ben riconoscibile.

Fig. 8 — Ignesti method × 200. Notwithstanding the artefacts due to the ancient age of the tissue, the composition in isolated or bundled muscle fibres is evident. In many sites the fibres connect with contiguous ones by their extremities. The syncytial type of the tissue emerges well recognisable.

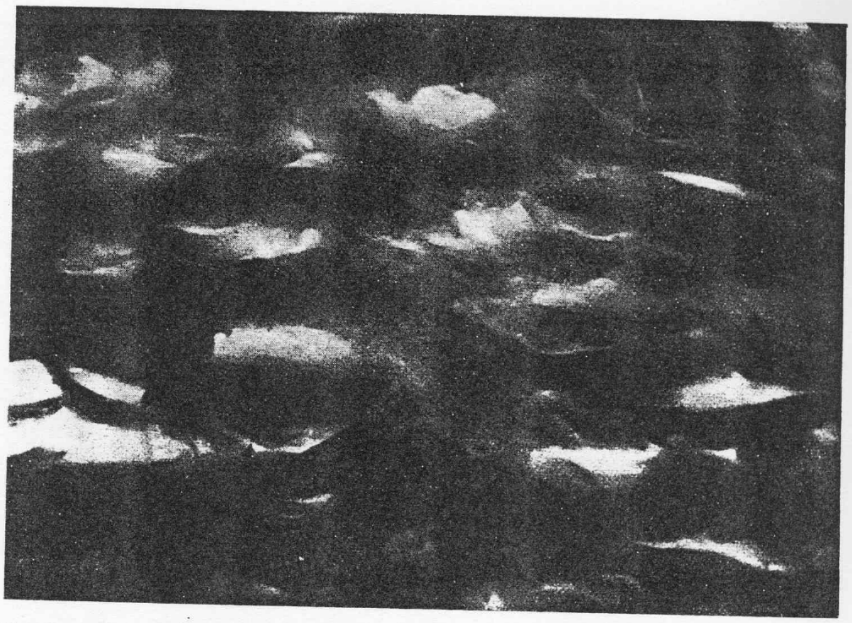


Fig. 9 — Emat.-Eos. x 350. Il tessuto muscolare striato dimostra, con particolare chiarezza, confluenza sinciziale delle fibre. Inoltre, nell'angolo inferiore destro, si riconoscono due connessioni trasversali fra le fibre. I dati sono particolarmente dimostrativi per il tessuto miocardico.

Fig. 9 — Haem.-Eos. × 350. The striated muscle tissue demonstrates, with particular clarity, syncytial confluence of the fibres. Furthermore, in the lower right angle, two transverse connections between the fibres can be recognised. The data are particularly demonstrative for myocardial tissue.

Fig. 10 — Emat.-Eos. x 400. Struttura in fibre compatte, addensate, fatto che sollecita l'immagine di un sincizio.

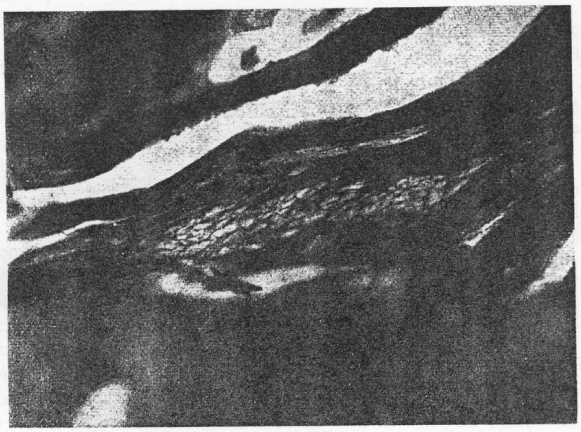


Fig. 11 — Emat.-Eos. x 200. In un lobulo di tessuto adiposo nell'interstizio della muscolatura striata. Le fibre si dissociano e si disperdono fra i lipociti, reperto di pertinenza miocardica.

Fig. 10 — Haem.-Eos. × 400. Structure in compact, condensed fibres, a fact that evokes the image of a syncytium. Fig. 11 — Haem.-Eos. × 200. In a lobule of adipose tissue in the interstitium of the striated musculature. The fibres dissociate and disperse among the lipocytes, a finding pertaining to myocardial tissue.

haematoxylin-eosin staining, no cellular elements appear but a finely granular material of yellowish-brown-greenish colour, together with rare foreign bodies of probable vegetable nature.

III. Microchemical study of the ancient Blood

The Teichmann reaction modified by Bertrand for haematin hydrochloride and that of Takayama for haemochromogen were carried out on the ancient Blood of Lanciano with a negative result, in parallel with samples of normal dried human blood, which gave a positive result. The search for oxidases (Stone and Burke test) gave an intensely positive result in the sample under examination and in the controls of normal dried human blood.

IV. Thin-layer chromatographic search for haemoglobin in the ancient Blood

Standards of haemoglobin and alkaline haematin prepared according to the technique of Dacie (1957 [2]) were run on a silica-gel plate together with the elution liquid of the Blood of Lanciano, also converted to alkaline haematin according to the cited technique, this chemical form having proved the most suitable for chromatographic purposes. The running liquid was methanol–acetic acid–water in the ratio 90:3:7.

After 90 minutes, alignment of the sample (ancient Blood of Lanciano) with the standards was noted (Fig. 12), both having the same Rf (0.88). The test demonstrates full repeatability, as it was performed in triplicate and with different placement of the components on the starting line.

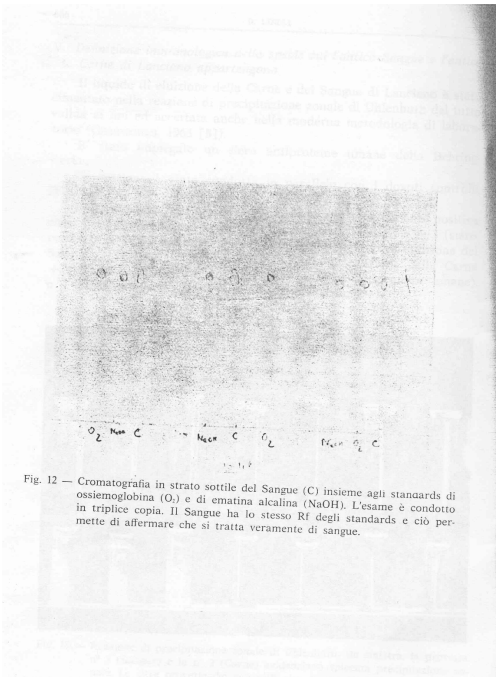


Fig. 12 — Cromatografia in strato sottile del Sangue (C) insieme agli stanoards di ossiemoglobina (O_2) e di ematina alcalina (NaOH). L'esame è condotto in triplice copia. Il Sangue ha lo stesso Rf degli standards e ciò permette di affermare che si tratta veramente di sangue.

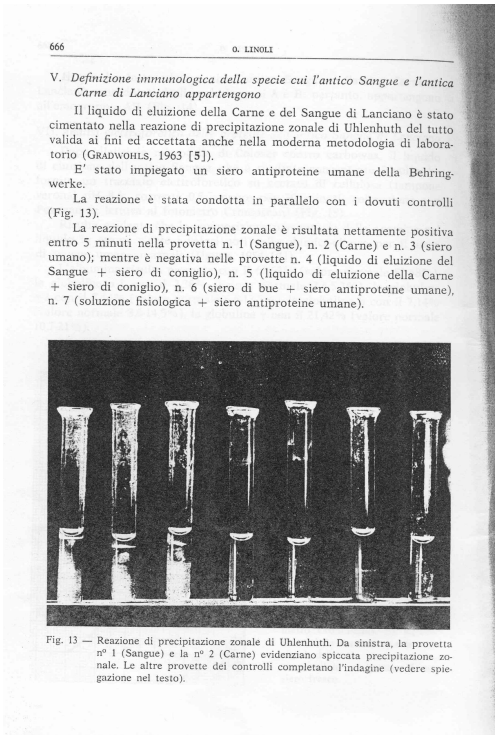
Fig. 12 — Thin-layer chromatography of the Blood (C) together with the standards of oxyhaemoglobin (O■) and alkaline haematin (NaOH). The examination is conducted in triplicate. The Blood has the same Rf as the standards and this allows it to be affirmed that it is truly blood.

Conclusions (II., III. and IV.): the negativity of the Teichmann-Bertrand and Takayama tests does not exclude the presence of blood, such tests being able to become negative owing to denaturation of the sample. The positivity of the oxidase search, generically indicative for blood, can also occur in the presence of organs rich in ferments, vegetable extracts, and finely divided metals. The chromatographic test on paper (Franchini, 1966 [4]), or as employed here more finely in thin layer, has full value for the recognition of blood even in gravely damaged materials that no longer provide the reactions of haemoglobin. The present study confirms, in this way, the true haematic nature of the ancient Blood of Lanciano.

V. Immunological definition of the species to which the ancient Blood and the ancient Flesh of Lanciano belong

The elution liquid of the Flesh and Blood of Lanciano was tested in the Uhlenhuth zonal precipitation reaction, entirely valid for the purpose and accepted also in modern laboratory methodology (Gradwohls, 1963 [5]). A Behringwerke anti-human protein serum was employed. The reaction was conducted in parallel with the appropriate controls (Fig. 13).

The zonal precipitation reaction proved clearly positive within 5 minutes in test tube no. 1 (Blood), no. 2 (Flesh) and no. 3 (human serum); while it is negative in test tubes no. 4 (elution liquid of Blood + rabbit serum), no. 5 (elution liquid of Flesh + rabbit serum), no. 6 (bovine serum + anti-human protein serum), no. 7 (physiological solution + anti-human protein serum).



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V. *Definizione immunologica della specie cui l'antico Sangue e l'antica Carne di Lanciano appartengono*

Il liquido di eluizione della Carne e del Sangue di Lanciano è stato cimentato nella reazione di precipitazione zonale di Uhlenhuth del tutto valida ai fini ed accettata anche nella moderna metodologia di laboratorio (GRADWOHLS, 1963 [5]).

E' stato impiegato un siero antiproteine umane della Behringwerke.

La reazione è stata condotta in parallelo con i dovuti controlli (Fig. 13).

La reazione di precipitazione zonale è risultata nettamente positiva entro 5 minuti nella provetta n. 1 (Sangue), n. 2 (Carne) e n. 3 (siero umano); mentre è negativa nelle provette n. 4 (liquido di eluizione del Sangue + siero di coniglio), n. 5 (liquido di eluizione della Carne + siero di coniglio), n. 6 (siero di bue + siero antiproteine umane), n. 7 (soluzione fisiologica + siero antiproteine umane).

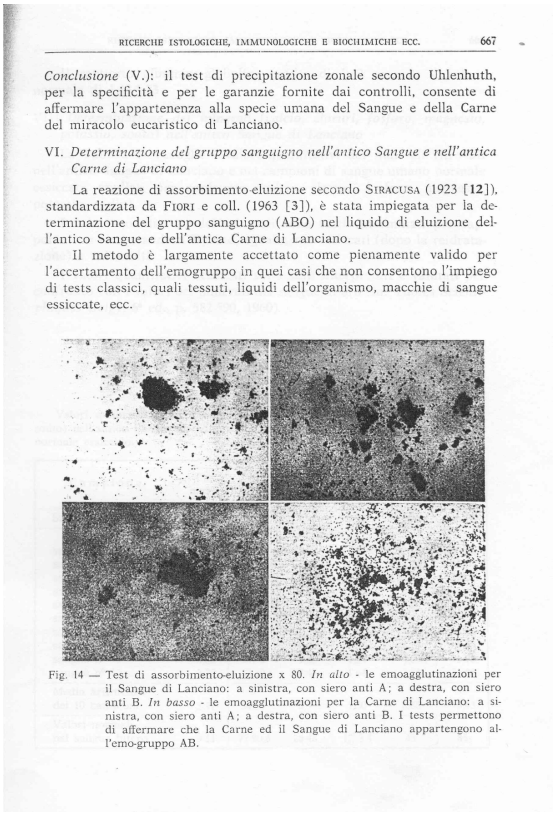
Fig. 13 — Reazione di precipitazione zonale di Uhlenhuth. Da sinistra, la provetta n° 1 (Sangue) e la n° 2 (Carne) evidenziano spiccata precipitazione zonale. Le altre provette dei controlli completano l'indagine (vedere spiegazione nel testo).

Fig. 13 — Uhlenhuth zonal precipitation reaction. From the left, test tube no. 1 (Blood) and no. 2 (Flesh) show marked zonal precipitation. The other control test tubes complete the investigation (see explanation in text).

Conclusion (V.): the zonal precipitation test according to Uhlenhuth, for its specificity and for the guarantees furnished by the controls, allows it to be affirmed that the Blood and Flesh of the Eucharistic miracle of Lanciano belong to the human species.

VI. Determination of the blood group in the ancient Blood and the ancient Flesh of Lanciano

The absorption-elution reaction according to Siracusa (1923 [12]), standardised by Fiori et al. (1963 [3]), was employed for the determination of the blood group (ABO) in the elution liquid of the ancient Blood and ancient Flesh of Lanciano. The method is widely accepted as fully valid for the ascertainment of the blood group in those cases that do not permit the use of classical tests, such as tissues, body fluids, dried bloodstains, etc.



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Conclusione (V.): il test di precipitazione zonale secondo Uhlenhuth, per la specificità e per le garanzie fornite dai controlli, consente di affermare l'appartenenza alla specie umana del Sangue e della Carne del miracolo eucaristico di Lanciano.

VI. *Determinazione del gruppo sanguigno nell'antico Sangue e nell'antica Carne di Lanciano*

La reazione di assorbimento-eluizione secondo SIRACUSA (1923 [**12**]), standardizzata da FIORI e coll. (1963 [3]), è stata impiegata per la determinazione del gruppo sanguigno (ABO) nel liquido di eluizione dell'antico Sangue e dell'antica Carne di Lanciano.

Il metodo è largamente accettato come pienamente valido per l'accertamento dell'emogruppo in quei casi che non consentono l'impiego di tests classici, quali tessuti, liquidi dell'organismo, macchie di sangue essiccate, ecc.

Fig. 14 — Test di assorbimento-eluizione x 80. *In alto* - le emoagglutinazioni per il Sangue di Lanciano: a sinistra, con siero anti A; a destra, con siero anti B. *In basso* - le emoagglutinazioni per la Carne di Lanciano: a sinistra, con siero anti A; a destra, con siero anti B. I tests permettono di affermare che la Carne ed il Sangue di Lanciano appartengono all'emo-gruppo AB.

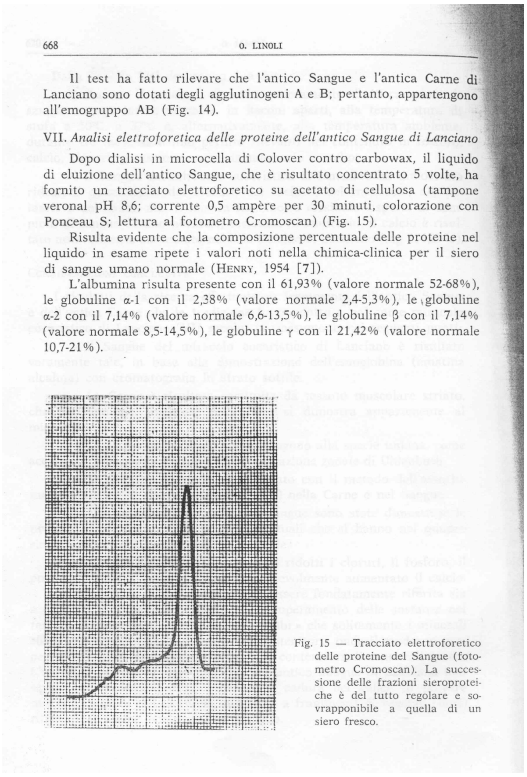
Fig. 14 — Absorption-elution test × 80. Above — the haemagglutinations for the Blood of Lanciano: on the left, with anti-A serum; on the right, with anti-B serum. Below — the haemagglutinations for the Flesh of Lanciano: on the left, with anti-A serum; on the right, with anti-B serum. The tests allow it to be affirmed that the Flesh and Blood of Lanciano belong to blood group AB.

The test revealed that the ancient Blood and the ancient Flesh of Lanciano are endowed with the A and B agglutinins; accordingly, they belong to blood group AB (Fig. 14).

VII. Electrophoretic analysis of the proteins of the ancient Blood of Lanciano

After dialysis in a Colover microcell against carbowax, the elution liquid of the ancient Blood, which proved concentrated 5 times, furnished an electrophoretic tracing on cellulose acetate (veronal buffer pH 8.6; current 0.5 amperes for 30 minutes; Ponceau S staining; reading with the Cromoscan photometer) (Fig. 15).

It results evident that the percentage composition of the proteins in the liquid under examination reproduces the values known in clinical chemistry for normal human blood serum (Henry, 1954 [7]). Albumin is present at 61.93% (normal value 52–68%), alpha-1 globulins at 2.38% (normal value 2.4–5.3%), alpha-2 globulins at 7.14% (normal value 6.6–13.5%), beta globulins at 7.14% (normal value 8.5–14.5%), gamma globulins at 21.42% (normal value 10.7–21%).



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Il test ha fatto rilevare che l'antico Sangue e l'antica Carne di Lanciano sono dotati degli agglutinogeni A e B; pertanto, appartengono all'emogruppo AB (Fig. 14).

VII. *Analisi elettroforetica delle proteine dell'antico Sangue di Lanciano*

Dopo dialisi in microcella di Colover contro carbowax, il liquido di eluizione dell'antico Sangue, che è risultato concentrato 5 volte, ha fornito un tracciato elettroforetico su acetato di cellulosa (tampone veronal pH 8,6; corrente 0,5 ampère per 30 minuti, colorazione con Ponceau S; lettura al fotometro Cromoscan) (Fig. 15).

Risulta evidente che la composizione percentuale delle proteine nel liquido in esame ripete i valori noti nella chimica-clinica per il siero di sangue umano normale (Henry, 1954 [7]).

L'albumina risulta presente con il 61,93% (valore normale 52-68%), le globuline α-1 con il 2,38% (valore normale 2,4-5,3%), le globuline α-2 con il 7,14% (valore normale 6,6-13,5%), le globuline β con il 7,14% (valore normale 8,5-14,5%), le globuline γ con il 21,42% (valore normale 10,7-21%).

Fig. 15 — Tracciato elettroforetico delle proteine del Sangue (fotometro Cromoscan). La successione delle frazioni sieroproteiche è del tutto regolare e sovrapponibile a quella di un siero fresco.

Fig. 15 — Electrophoretic tracing of the proteins of the Blood (Cromoscan photometer). The succession of the serum-protein fractions is entirely regular and superimposable on that of a fresh serum.

The albumin-globulin ratio results as 1.62, the normal value being 1.13–1.73.

VIII. Determination of minerals (calcium, chlorides, phosphorus, magnesium, potassium, sodium) in the ancient Blood of Lanciano

Table I collects the quantitative values of the minerals found in the ancient Blood of Lanciano and in the samples of normal dried human blood studied for comparison (calcium, chlorides, phosphorus, magnesium, potassium, sodium). The quantitative values of the minerals were determined relative to standard Hyland sera, equally dried (after rehydration) and redissolved. The quantitative values ascertained were interpreted and evaluated by comparison with the values of minerals in whole blood (Tables Scientiphiques Geigy, 6th ed., pp. 582–590, 1960).

TABLE I

Quantitative values of minerals (calcium, chlorides, phosphorus, magnesium, potassium, sodium) in the ancient Blood of Lanciano and in 10 samples of normal dried whole human blood.

Sample	Ca mg%	Cl mEq/l	P mg%	Mg mEq/l	K mEq/l	Na mEq/l
Blood of Lanciano	114.29	2.25	1.99	0.96	5.76	46.44
blood no. 1	4.42	31.8	8.42	1.57	12.80	55.04
blood no. 2	3.96	30.75	8.37	1.52	12.16	48.16
blood no. 3	3.73	31.50	8.75	1.15	14.08	48.16
blood no. 4	4.66	43.20	8.10	1.39	5.12	116.9
blood no. 5	3.73	37.70	9.72	1.39	4.80	99.76
blood no. 6	3.26	31.76	8.42	1.54	3.84	79.12
blood no. 7	4.89	35.2	9.07	1.82	4.00	65.36
blood no. 8	3.96	36.00	10.00	1.66	4.16	68.80
blood no. 9	3.82	34.40	9.55	1.34	4.00	79.12
blood no. 10	3.35	32.80	9.47	1.64	3.84	73.96
Arithmetic mean (10 samples)	**3.97**	**34.51**	**8.98**	**1.50**	**6.88**	**73.43**
Normal values in whole blood	**9–11**	**77–90.6**	**28–48**	**1.7–3.4**	**43**	**85**

From Table I, two data are derived:

a) during the process of slow desiccation of 10 samples of normal whole human blood, in open flasks, at the temperature of an oven at 50°C, at 37°C and, alternately, at room temperature, for three months, there are significant losses in the content of phosphorus, calcium, chlorides, potassium, and slight losses in magnesium and sodium;

b) the Blood of the Eucharistic miracle of Lanciano has demonstrated quantitative reductions of chlorides, phosphorus, magnesium, potassium and sodium, but to a degree not very dissimilar with respect to the samples of normal dried human blood. On the contrary, calcium proved notably increased in the Blood of Lanciano alone (114.29 mg%).

CONCLUDING CONSIDERATIONS

The results of the investigation carried out on fragments of the ancient Blood and ancient Flesh that tradition has handed down to us as the Eucharistic miracle of Lanciano (VII century) are summarised in the following points:

— the Blood of the Eucharistic miracle of Lanciano proved truly such, on the basis of the demonstration of haemoglobin (alkaline haematin) by thin-layer chromatography.

— the Flesh proved to be constituted by striated muscle tissue, which by the syncytial union of the fibres is demonstrated to belong to the myocardium.

— the Flesh and Blood belong to the human species, as ascertained on the basis of the Uhlenhuth zonal precipitation reaction.

— the blood group, determined with the absorption-elution method, proved identical (AB) in the Flesh and Blood.

— in the elution liquid of the Blood the proteins were demonstrated, fractionated in the percentage ratios that are found in the serum-protein picture of normal fresh blood.

— in the blood chlorides, phosphorus, potassium and sodium were found reduced, while calcium proved notably increased.

This reduction of minerals can be well-foundedly attributed both to processes of ageing and depletion of substances in the tissue during so many centuries, and to «exchanges» that minerals habitually carry out with the glass wall of the container, hence the modern practice, for solutions of greater value, of containers of inert materials. The increase of calcium (114.29 mg%) in the ancient Blood of Lanciano can be, in a well-founded hypothesis, correlated to the fall into the chalice of masonry powder rich in calcium salts, besides fragments of vegetable matter (flowers) found at the histological examination of the Blood.

The histological diagnosis of myocardium, founded on indisputable objective elements (*), renders little acceptable the hypothesis of a «fake» carried out in antiquity.

Indeed, even supposing that the heart had been removed from a corpse, it must be held that only an expert hand in anatomical dissection could have, and not without serious difficulty, obtained from a hollow viscus a uniform and continuous «slice», tangentially to the surface of the viscus, as is deduced from the predominantly longitudinal course of the myocardial fibres, bearing in mind (Chiarugi, 1934 [1]) that precisely in the superficial, mantle zone of the heart are found the bundles of fibres with a longitudinal course that rapidly becomes oblique.

The present study, finally, confirms the possibility that in tissues of ancient date organic materials such as proteins may remain, almost as if transcending the fatal destiny of flesh.

The proteins and the antigens of blood group AB present in the ancient Flesh and ancient Blood of Lanciano after 1200 years accord with the finding of proteins in Egyptian mummies dating back 4000 years (Hansemann, 1904 [6]) and 5000 years (Meyer, 1904 [9]), even though it is objectively recognised that the situation of a mummified body with the known procedures and protected as far as possible from contact with the external environment is very different from that of a flap of myocardium and of blood clots left in a natural state during the centuries and, furthermore, exposed to the action of atmospheric, environmental and parasitic physical agents.

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RIASSUNTO

Linoli O. — Ricerche istologiche, immunologiche e biochimiche sulla carne e sul sangue del miracolo eucaristico di Lanciano (VII secolo).

— Sono descritti gli aspetti macroscopici della Carne e del Sangue del miracolo eucaristico di Lanciano (VII secolo).

— Sono state effettuate ricerche istologiche dalle quali è stato accertato che la Carne si compone di un tessuto mesodermale riconoscibile come miocardio.

(*) The diagnosis is fully supported by Prof. Ruggero Bertelli, Emeritus of Normal Human Anatomy at the University of Siena, whom I sincerely thank.

— Le varie ricerche eseguite sul Sangue, ed in particolare la cromatografia in strato sottile, hanno permesso di riconoscere trattarsi veramente di Sangue.

— La natura umana dell'antico Sangue e dell'antica Carne di Lanciano è stata dimostrata immunologicamente a mezzo di reazione di precipitazione zonale di Uhlenhuth.

— Il gruppo sanguigno ricercato sui liquidi di eluizione dell'antico Sangue e dell'antica Carne è risultato eguale nei due tessuti (gruppo AB).

— Il tracciato elettroforetico delle proteine sieriche dell'antico Sangue ha presentato aspetti sovrapponibili a quelli forniti da un siero fresco.

— Nell'antico Sangue sono risultati sensibilmente ridotti il sodio, il potassio, i cloruri, il fosforo totale inorganico e il magnesio, mentre il calcio è risultato aumentato.

SUMMARY

The following Summary is reproduced verbatim from Linoli's own English-language abstract as it appears in the original 1971 publication, including all original spellings and grammatical constructions.

Linoli O. — Hystological, immunological and biochemical researches on Flesch and Blood of the Eucharistic miracle of Lanciano (VII Century).

— Here are described the macroscopic aspects of the Flesch and the Blood of the eucharistic miracle which happened in Lanciano back in the seventh century.

— Istological research has been carried out from which it as been ascertained that the Flesch is formed by a mesodermal tissue recognizable as myocardium.

— The various kind of research performed on the Blood especially thin-layer chromatography, pointed aut that the substance was real blood.

— The human nature of the ancient Blood and Flesch of Lanciano has been proved immunologically through the reaction of zonal precipitation by Uhlenhuth.

— The blood group researche on the fluids of eluition of the ancient Flesch and Blood has turned out to be the same in the two tissues (group AB).

— The electrophoretic picture of the serum proteins of the ancient Blood has presented aspects coincidental with ones provided by fresh serum.

— Remarkable reductions can be appreciated in the ancient Blood as far as sodium, potassium, chlorides, inorganic total phosphorus and magnesium are concerned, whreas calcium has increased.

RÉSUMÉ

The following Résumé is reproduced verbatim from the original French-language abstract as it appears in the 1971 publication.

Linoli O. — Recherches hystologiques, immunologiques et biochimiques sur la Chair et sur le Sang du miracle éucaristique de Lanciano (VII siècle).

— Les aspects macroscopiques de la Chair e du Sang du miracle éucaristique de Lanciano (VII siècle) sont decrit.

— On a effectué des recherches histologiques d'ou l'on a constaté que la Chair est composé d'un tissu mésodermal reconnu comme myocarde.

— Les recherches faites sur le Sang et en manière particulaire la chromatographie en minces souches ont permis de reconnaitre qu'il s'agit vraiment de sang.

— La nature humaine du Sang antique et de la Chair de Lanciano a été témoigné immunologiquement par la réaction de précipitation de Uhlenhuth.

— Le groupe sanguin recherché sur les fluides d'eluition du antique Sang et de la Chair a donné un égal resultat (groupe AB).

— L'electrophoregram des proteins du Sang antique a présenté des aspects qu'on peut placer à l'égal d'un serum frais.

— De remarquable réductions ont paru dans le Sang antique pour le sodium, le potassium, le chlorure, le phosphore, le magnesium, tandis que le calcium a donné une augmentation.

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Strictly literal English translation prepared for archival reference. Source: Quad. Sclavo Diagn., Vol. 7, No. 3, September 1971, pp. 661–674. PMID: 4950729.