

Hypogea2023

Proceedings of IV International Congress of Speleology in Artificial Cavities
Italy, Genoa, September 29th / October 1st



EDITORS

Stefano Saj, Carla Galeazzi

Michele Betti, Francesco Faccini, Paolo Madonia





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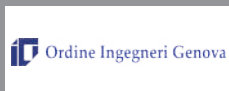
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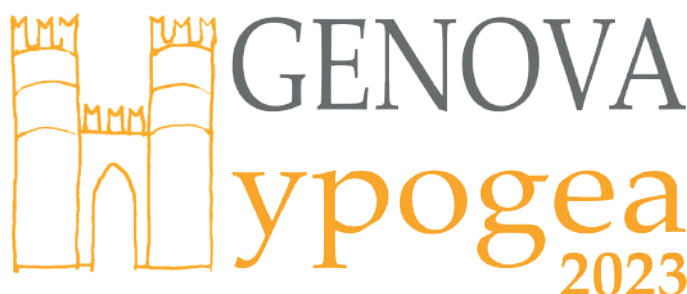


PROCEEDINGS OF IV INTERNATIONAL CONGRESS OF SPELEOLOGY IN ARTIFICIAL CAVITIES

HYPOGEA2023

SEPTEMBER 29th / OCTOBER 1st
GENOA, ITALY

PALAZZO DUCALE, SALA MINOR CONSIGLIO
Piazza Matteotti 9, Genova



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Edited by
CENTRO STUDI SOTTERRANEI

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The plague (1656-1657) in the history of the Maritime Republic of Genoa (Italy): an important testimony of efficacious measures of safety and prevention in the field of hygiene and public health and a wonderful discovery of a precious historical heritage to protect. A “blend” of speleology and history of medicine

Mariano Martini^{1,2,3,*}, Stefano Saj^{4,5,6}, Danilo Repetto^{4,7}, Martino Terrone⁸,
Simon Luca Trigona⁹, Nico Radi⁹, Giancarlo Icardi^{1,3} and Francesca Ferrando¹⁰

Abstract

The epidemic of bubonic plague that hit Genoa and its domain between May 1656 and August 1657 has gone down in history as the most fierce and devastating calamity to strike the territory of the Republic of Genoa during the modern age. Its severity is revealed by a remarkable historiography, which, right from the beginning of the epidemic, dealt with the features of the disease and the means utilized to control its spread. This study comes also from the discovery of skeletal remains (that are probably attributable to the plague of 1656/57) which first came to light in 1989, by the *Centro Studi Sotterranei* (Centre for Underground Studies) of Genoa which, this year, has resumed research in collaboration with the local Superintendency, the University of Genoa and the University of Urbino. For hundreds of years, these have remained buried under Acquasola Park, in a central area of Genoa. The authors analyze the institutional response of the Republic of Genoa to this calamity that devastated the city. This contribution initially focuses on the public health measures implemented, as demonstrated by original, unpublished and archival documents found in local archival sources, furthermore studies and research with the best specialist centers in the sector could soon allow us to shed new light on this destructive event and to clarify what it meant for the entire Genoese population and beyond. Genoa, at that time, was divided into 20 zones, each of which was placed under the authority of a commissioner endowed with criminal jurisdiction. The Commissioners' duties concerned the spheres of public health, public order, and other preventive measures. The measures implemented by the Health Magistrate roughly retraced the model that had already been tried and tested during the plague of 1579: public health officers were deployed to guard the coasts; the city gates were garrisoned, and a network of secondary hospitals was created to relieve the pressure on the Lazaretto at the Foce. This structure, built in the early 16th century, was the city's main outpost for the treatment of plague victims. The Commissioners of the zones were called upon to enforce the regulations of the Health Magistrate and to maintain public order. The experience of the plague in Genoa in the 17th century once again testifies to the importance of adopting measures of safety and prevention in the field of hygiene and public health. Genoa was well organized from the public health standpoint; its planning was innovative, and its set of dedicated norms and system of sanctions proved to be fairly efficacious. From the historical-social, standpoint and public health perspectives, this crucial experience clearly shows the organization of a large and powerful port city, which was at the time one of the most flourishing commercial and financial hub.

Keywords: *history of hygiene and public health; history of pandemics; plague; Maritime Republic of Genoa; speleology; history of medicine.*

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Fig. 1 – Cover of the six-monthly *Speleologia* magazine published by the Italian Speleological Society, depicting the last impressive unloading of bones inside the sixteenth-century bastion of Acquasola, belonging to the VI city walls (XVI century) of Genoa (photo C. Leoni).

Introduction

In October 1989, during a speleological expedition to explore some underground tunnels in the “Sestiere della Maddalena” – one of the six ancient districts of Genoa – a remarkable discovery was made by the Genoese team of explorers from the National Commission for Artificial Cavities of the Italian Speleological Society. The team was composed by Luca Canepa, Roberto Guagliardi, Marcella Marcenaro, Laura Marchesi, and Stefano Saj.

Descending through a manhole, the group entered an underground passageway located 12 meters beneath the Spianata dell’Acquasola.

After a very narrow and difficult path, the researchers found the walls structures of the 16th-century Bastione dell’Acquasola, which had been buried and forgotten under the homonymous public park.

Inside the galleries of the military fortification, the speleologists made an important and astonishing discovery. In the darkness, under the light of their torches, they found piles of skulls and bones,

a vast osteological deposit of thousands of skeletal remains not in anatomical connection (Bixio-Saj, 1991) (Fig. 1).

The press emphasized the extraordinary discovery and called the site: the “città dei morti (city of the dead)” (Fig. 2).

The plague that reached Genoa by sea

The epidemic broke out in 1647 on the African coast, from where it spread first to Andalusia and then to Catalonia. It was subsequently carried by an infected ship from the port of Barcelona, reaching Sardinia in 1652. In Sardinia, the disease struck in two waves:

- the first wave (1652-1653) involved the northern part of the island and carried a mortality rate of over 55%;
- the second wave (1654-1657) involved the central and southern parts, from where it spread to mainland Italy.

Between April and May 1656, the plague reached Naples, followed by Rome and finally Genoa. The pattern of its spread was always the same; the disease first appeared in the vicinity of a port (in Rome, the cities of Civitavecchia and Nettuno) and then spread like wildfire throughout the rest of the territory, following trade routes and the pathways of flight from the cities to the countryside (Topi, 2017).

Although commerce with the port of Civitavecchia was banned by cities such as Rome, Florence, Livorno and Lucca, Genoa continued to receive traffic up to the month of June. The Republic of Genoa, however, was well organized, and as early as the 16th century had been endowed with an effective system to safeguard public health. Hence, the plague did not catch the city off its guard; the public health system, which had already been tested by the 1648-1650 epidemic of exanthematous typhus, was activated as soon as the plague manifested itself in Sardinia.

In the city of Genoa, there was much talk of the plague, and, on the proposal of the Magistrate for Health, particular measures were adopted in order to reduce the probability of contagion. Nevertheless, these measures were initially ignored by most of the population (ASGe, Magistrato della Sanità, ms. 498, 1656).

Paradoxically, this non-cooperation was greatest in the poorest and most populous neighbourhoods, precisely those that were at greatest risk, and which should have been the first to comply with the new measures and restrictions. Thus, the attempt to cordon off the city, to impose quarantine and to ban the importation of goods coming from infected areas did not meet with success, and in May 1656, the disease reached Genoa’s neighbouring villages in the Bisagno Captaincy (Assereto, 2011).

At the time when the plague hit Genoa, about 90% of the city’s population lived within the “old walls”, in cramped houses with little sunlight and in an unhealthy environment without adequate sanitation. As a result, the spread of the plague was rapid and devastating.

12 GENOVA/REGIONE

IL SECOLO XIX

Giovedì 23 novembre 1899

Dopo lo straordinario ritrovamento del porto di Colombo, una nuova scoperta nella Genova dimenticata e misteriosa

Indiana Jones nella città dei morti

Un dedalo di cunicoli e migliaia di scheletri sotto l'Acquasola

Quindici speleologi entrano nell'altra Genova
Chi sono i Sotterranei



«La nostra attività si lega a doppia mano con la speleologia urbana. Ha finalità di studio, ricerca, esplorazione e rilevamento topografico delle cavità e dei condotti artificiali realizzati dall'uomo nel sottosuolo urbano nel corso dei secoli. Ecco chi sono e cosa fanno gli "esploratori sotterranei" genovesi della Società Speleologica Italiana, il gruppo (una quindicina di persone) che ha trovato la "città dei morti" seicentesca sotto l'Acquasola».

Quello genovese è un gruppo di lavoro molto eterogeneo, che raccoglie persone con competenze tecnico-scientifiche differenti e comunque interdisciplinari. Agli speleologi si affiancano architetti, geologi, storici, archeologi, fotografi e urbanisti. Prima della scoperta della "città dei morti" sotto l'Acquasola, il gruppo degli "underground" ha concentrato le sue esplorazioni su alcune zone della città storica, particolarmente difficili per questo tipo d'indagine ma ricche di spunti architettonici. Fino ad oggi le aree "visitate" dal gruppo degli speleologi genovesi hanno spaziato dai sotterranei di palazzo Ducale a via San Lorenzo, dalla Comenda di Pre a via Gramsci, da spianata Castelletto al no Carbonara.

La tecnica è sempre la stessa: prima indagine su fonti d'archivio e bibliografiche, poi visita "sul campo" con fotografie e rilevamenti topografici e archeometrici, infine mappatura su quanto esplorato.

La Superba riscopre le sue radici e i fantasmi della città dissolta si dissolvono, sempre più, alle spalle di architetti e progettisti. A pochi giorni dal ritorno alla luce dei molti trecenteschi davanti a Caricamento, Genova ora s'imbocca nelle "catcombe della peste" sotto l'Acquasola.

Una fresca archeologica a ritmo incalzante, quasi concorrente e commovente, fantastica, che attraversa "underground" la città da un quartiere all'altro. La Genova medioevale e tardo-medioevale dei cunicoli, delle gallerie, dei trivoli sommersi, delle fortificazioni stratificate si è presa una doppia rivisita nel giro di poche settimane.

L'Espresso riporta all'onore della città i mostri di Cristoforo Colombo, una scampata esplorazione sotterranea — altrettanto straordinaria e casuale — scopre un gigantesco ossario fra i bastioni cinquecenteschi dell'Acquasola. Si parla di migliaia di corpi, forse diecimila. I resti umani della pestilenza che si è abbattuta sulla città nel 1656-57? Più di trecento anni di silenzi e di scheletri riscoperti — davvero per caso — da un gruppo di speleologi genovesi alla ricerca di testimonianze militari e fortificazioni tardo-medioevali.

«Sì, è vero. Questi straordinari reperti sono stati una grande sorpresa anche per noi», ammettono Roberto Bizio, speleologo, di professione consulente immobiliare, Roberto Giagiaroli, regista-speleologo, e Stefano Sai, architetto ovviamente speleologo. Tutti esperti della Società Speleologica Italiana. «Eravamo scesi in un chiuso strada di viale di viale, nel 1972. Un'indagine di routine, per un lavoro del gruppo — soprattutto per ritrovare le mura delle fortificazioni del 1536 intorno all'Acquasola. Siamo scesi una



decina di metri per un pozzo e da qui abbiamo scoperto un sistema di gallerie, perforazioni, cunicoli, che si sviluppa per centinaia di metri alla base delle mura fortificate del XVI secolo».

Un cunicolo, in origine alto un paio di metri e largo la metà, realizzato secondo una buona tecnica costruttiva con mattoni sulla volta e fianchi in pietra da taglio, testimonia Stefano Sai, l'architetto della spedizione. Già questo primo passaggio non è stato comunque agevole per il gruppo di speleologi: «In rari casi, l'aderenza del cunicolo era ridotta ad una ventanella di centimetri, per via del limo fungoso accumulato sul fondo da secoli di infiltrazioni».

Ma la sorpresa più ghiotta, ancorché macabra, è proprio dietro l'angolo, qualche metro più in là. Percorrendo quel primo cunicolo, gli "esploratori" si rendono conto della presenza di altre gallerie su diversi livelli: camminamenti lungo le fortificazioni seicentesche, che aprono la fantasia degli speleologi — nella direzione "superficiale" di corso Po — a gallerie più ampie, ricche di nicchie, di portali, scale e stipiti in urto, perfettamente conservati. «Eravamo nel cuore dell'antica bastione dell'Acquasola. E proprio curando fra questi camminamenti più ampi e nelle ripide, ricche di nicchie, di portali, scale e stipiti in urto, perfettamente conservati. «Eravamo nel cuore dell'antica bastione dell'Acquasola. E proprio curando fra questi camminamenti più ampi e nelle ripide, ricche di nicchie, di portali, scale e stipiti in urto, perfettamente conservati. «Eravamo nel cuore dell'antica bastione dell'Acquasola. E proprio curando fra questi camminamenti più ampi e nelle ripide, ricche di nicchie, di portali, scale e stipiti in urto, perfettamente conservati.



aperto. Ma Stefano Sai avanza un'ipotesi: «Da come abbiamo ritrovato questi resti, ammassati e ammucchiati, si dovrebbe pensare ad un trasporto fatto in fretta, in tempi più recenti. Un ipotesi? Quasi certamente si tratta dei morti di pestilenza sepolti in tumuli nel Seicento e trasportati qui, nel bastione ormai in disuso, durante i lavori per il parco dell'Acquasola, voluti dal Borghese all'inizio dell'Ottocento».

Un trionfo di qualche decina di metri, fatto a quasi due secoli di distanza, del quale — secondo gli speleologi — si ha notizia negli annali genovesi. «Nessuno storico — affermano — dice dove siano finite le ossa riesumate durante i lavori per far nascere il parco dell'Acquasola e la cosa evidentemente, qui, allora, finì nel dimenticatoio».

E più vero comunque che Federico Alzetti scrisse nel 1875: «Questo io so che il terreno sorgeva in tumuli, e che tornò più scomposto e irregolare nel 1656, quando il tremendo flagello della moria vi mandò a piene carni le migliaia d'ammorati».

Fausto Fini

Nelle foto, l'ispezione del Gruppo speleologico italiano nei cunicoli medievali sotto l'Acquasola. Nelle due immagini in alto a destra e a sinistra i cumuli di scheletri colati nei bastioni sotterranei

Fig. 2 – Article in the newspaper "Il Secolo XIX" of Genoa with the news of the discovery of the ossuary found by speleologists in the subsoil of the Acquasola city park.

The "Magistrate for Health" and the public health measures implemented

Each day, the Magistrate for Health of the Republic of Genoa recorded the number of new cases of plague and of deaths. For this purpose, the city was divided into numerous districts; these were supervised by officials, who took a census of the inhabitants and their homes (ASGe Magistrato della Sanità, ms. 265, 1656). In general, the numbers of deaths and infections recorded by the neighbourhood commissioners were sent to the Magistrate for Health. In accordance with agreements made with neighbouring states, the Magistrate forwarded these data to the other health administrations at the end of each week.

Often, however, states did not trust the reports provided by their neighbours and sent their own officials to check the truth of the information. If the presence of the plague was confirmed, the infected state was declared off-limits, and transit and trade were strictly forbidden.

The measures implemented by the Magistrate for Health roughly retraced the model that had already been tried and tested during the plague of 1579: public

health officers were deployed to guard the coasts; the city gates were garrisoned, and a network of secondary hospitals was created to relieve the pressure on the Lazaretto at the Foce (Assereto, 2011).

In September 1656, the city authorities identified four areas (Fig. 3) inside the ancient walls; named after the patron saints of the city (St Laurence, St George, St John the Baptist and St Bernard), each of these areas was subdivided into five zones, denominated by the letters A to E (ASGe, Sanità, 1656).

Administration of these zones was entrusted to "Commissioners", who were randomly selected from among all the patricians aged between 25 and 70 years, excluding those already engaged as health officers in the coastal areas.

The Commissioners of the zones were called upon to enforce the regulations of the Magistrate for Health and to maintain public order. However, they also had duties in the sphere of public health and assistance (Campasso, 1669: 61v-67v).

Indeed, they had to coordinate the work of the health personnel, close and seal warehouses containing precious goods, ensure that the streets were kept clean, supervise the controlled burning of any type of con-

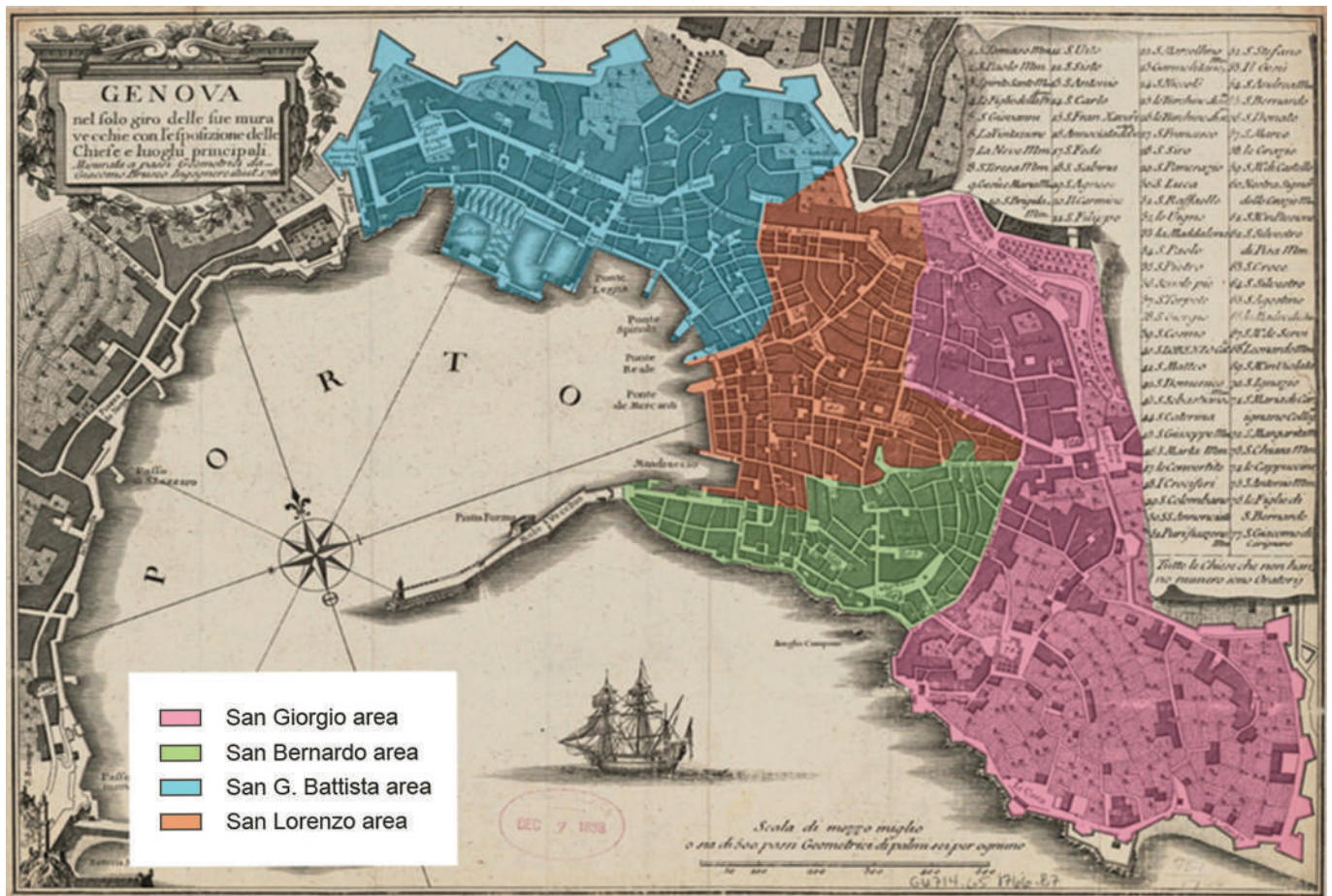


Fig. 3 – Division of the city of Genoa into areas (graphics F. Ferrando and M. Gogioso).

taminated material, etc... They were also responsible for ensuring that a doctor and surgeon were on duty in the various zones, even during the night, that quarantine procedures were properly respected, and that infected individuals were correctly transferred to the plague hospitals assigned. Any transgression or non-compliance with the orders of the Commissioners resulted in sanctions being directly imposed by the Commissioners themselves.

The Commissioners were assisted by chancellor and foremen (Campasso, 1669: 68r-75r), who verified the proper functioning of “sewers and wash-houses”, visited people in quarantine, and distributed bread and alms to the poorest. Their principal task, however, was to carry out a census of the population living in the streets under their jurisdiction and to record family data, for each house. During the 1656 plague, the Magistrate for the Poor suspended the Sunday distribution of “charity” bread in order to avoid dangerous gatherings of paupers. Silk, velvet and leather, but not only, were particularly dangerous and risky, as the particles of contagion could easily adhere to these materials and remain active for years and this was really a huge threat to everyone. For this reason, it was decided that clothes and any other material that could have come into contact with contaminated individuals should be immediately burnt.

Furthermore, in the various areas and neighbourhoods, a diffuse information network was set up; this was coordinated by the foremen and by some citizens, who were terrified by the effects of the plague and also worried about the consequences it was having on the city’s economy.

The Genoese plague hospitals and the management of the plague

One of the main tasks of the Commissioners was to manage the sick and to organise their transfer to the *Lazzaretto della Foce*. This plague hospital had been built at the mouth of the *Bisagno* river at the beginning of the 16th century as a result of the intervention of the *Compagnia del Divino Amore*, a lay brotherhood founded by the followers of *Saint Catherine Fieschi Adorno* and by the Genoese notary *Ettore Vernazza* (Solfaroli Camillocci, 1994).

This latter, as can be read on a plaque in the *Albergo dei Poveri* in Genoa, had been the most prominent welfare activist of his time. In Genoa alone, he had contributed to the foundation of the *Ospedale degli Incurabili*, of a “convent for penitents”, of a charitable organisation for homeless children and, above all, of

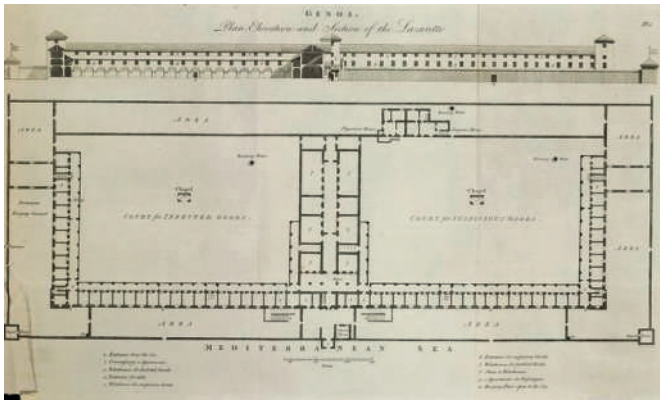


Fig. 4 – J. Howard, *An account of the principal lazarettos in Europe: with various papers relative to the plague: together with further observations on some foreign prisons and hospitals, and additional remarks on the present state of those in Great Britain and Ireland*, Printed by William Eyres, Warrington, 1789.

the “*Lazaretum ad ora Bisanii pro peste infectis*” (Ferando, 2023).

Indeed, in 1512, the “Protectors of the Incurably Sick” had obtained authorization from the Senate to build “a refuge capable of housing the sick [...] detained on account of epidemics”.

A further function was immediately added - that of the “purging” of goods, i.e. the quarantine of people and the fumigation of goods arriving from places suspected of being infected by the plague; this activity was directed by the *Magistrate for Health*. The refuge (Fig. 4) had a rectangular plan, with a perimeter courtyard divided into two others of equal size by a central arm, which was in turn divided longitudinally by an open-air corridor. Its location, at a safe distance outside the city walls, meant that it was isolated from the city, which was why it had been chosen at the end of the 16th century as the first place of internment for beggars.

Conclusions

The experience of the 17th century plague in Genoa illustrates the fundamental importance of the prevention and safety measures that were adopted in the field of public health. The same can be said of our recent experience of the Covid-19 pandemic.

The plague that hit Genoa in the 1600s was certainly a tough challenge for the city. As a subject of study, it is of interest to us from several points of view:

- hygiene;
- public health;
- epidemiology;
- patterns of spread of infectious diseases;
- legislation;
- health care organisation, etc...

In those days, although legislation and healthcare organisation were not particularly advanced, the situation was handled well. Moreover, efficient communication with the population was able to yield good results in terms of the diffusion of information and people’s perception of the devastating event in progress.

Obviously, however, it must be borne in mind that people’s behaviours and habits, especially with regard to hygiene, were far from optimal. In addition, at that time Genoa was a large city, a thriving commercial centre and,

During the first phase of the 1656 epidemic of the plague, the *Lazzaretto della Foce* served as a shelter for all infected persons. However, from October 1656 onwards, some were transferred to the *Convento della Consolazione*, directed by Father Antero da San Bonaventura (Antero da San Bonaventura, 1658).

Inside the plague hospitals, victims were assisted by a physician and a surgeon.

- **The physicians** ordered blood-letting, established the patients’ diet and chose which “refreshments”, i.e. syrups, to administer. According to Father Antero of San Bonaventura, the most effective potions were those composed of inexpensive elements, such as those based on “cedar fruit juice [...], and rose petal sugar [...] with distilled water, black salsify, or scabiosa e or chicory”, while alchermes and potions containing crushed pearls and were to be avoided.

- **The surgeons** were responsible for incising and cauterizing buboes, scarifying carbuncles and applying ointments to the lesions to help purge them of their fluid and to prevent wound infection and gangrene. As the months passed, however, it became increasingly difficult to find good quality ointments in the city, and each plague hospital produced its own by boiling black pitch and Greek pitch, white wax, pork fat and turpentine (Antero da San Bonaventura, 1658).

The wealthier classes objected to being assigned to the *Lazzaretto della Foce*, since it meant sharing cramped accommodation with members of the lowest social order. Furthermore, many claimed that the care provided was not beneficial and that theft and violence were commonplace.

The end of the plague did not mark the end of the city’s subdivision into districts; on the contrary, this scheme was adopted several times during the 17th century, in order to carry out censuses of the population and other operations, such as the assignment of street numbers to buildings and the maintenance of public lighting (ASGe, Senato Senarega, n. 1092).

above all, one of Europe's main ports; it was densely populated and many of its neighbourhoods were hemmed in by very narrow streets (the famous Genoese "*carrugi*").

All these circumstances facilitated the spread of the plague.

And yet, albeit with due caution and considering the standards of large cities in the middle of the 17th century, we can claim that Genoa was well organised from the public health standpoint; its planning was innovative, and its set of dedicated norms and system of sanctions proved to be fairly efficacious. Moreover, the strategy of dividing the city into zones in order to curb the spread of the plague proved to be effective, and the deployment of "neighbourhood commissioners" was able to yield greater control over daily activities.

This approach gained the approval of the citizenry, so much so that, once the emergency was over, the subdivision of the city into districts was maintained, being adopted for various purposes on other occasions during the 17th century (ASGe, Senato Senarega, 1092).

The study of this devastating historic event has prompted us to begin examining some skeletal remains that are probably attributable to the plague of 1656/57. For hundreds of years, these have remained buried under *Acquasola Park*, in a central area of Genoa. The remains first came to light in 1989, and this year research has been resumed by the *Centro di Studi Sotteranei* (Centre for Underground Studies) in collaboration with the University and the Genoese superintendence. Study and research with the best specialist centres in the sector could soon enable us to shed new light on this destructive event and to clarify what it meant for the entire population of Genoa and beyond.

Bibliography

- Antero da San Bonaventura P., 1658, *Li lazaretti della città e rivièr de Genova del MDCLVII [...] descritti dal R. P. Antero Maria da S. Bonaventura scalzo agostiniano*, Genova, Pietro Giovanni Calenzani e Francesco Meschini, ristampa anastatica 1974, Genova.
- Assereto G., 2011, *Per la comune salvezza dal morbo contagioso, I controlli di sanità nella Repubblica di Genova*, Città del Silenzio, Genova, pp. 15-20.
- Bixio R., Saj S., 1991, *La peste ed il basione dell'Acquasola*, in rivista *Speleologia*, n. 24, Società Speleologica Italiana Bologna, pp. 5-7.
- Campasso G.B., 1669, cc. 61v-67v, *Istruzioni dei commissari di quartiere*. Biblioteca Medica Mario Segale, Compendio de' decreti de Ser.mi Colleggi et Ill.mo Mag.to di Sanità con insertione di leggi de Consigli della Ser.ma Rep.ca per preservare, e liberare la città e dominio dalla peste negl'anni 1656 e 1657 raccolti da Gio. Bartolomeo.
- Campasso G.B., 1669, cc. 68r-75r, *Istruzioni dei capistrada*.
- Ferrando F., 2023, *Assistere, correggere, rieducare. I ricoveri per mendicanti di Genova, Bologna e Venezia (XVII-XVIII)*, Viella Ed., Roma, pp. 47-52.
- Solfaroli Camillocci D., 1994, *La "carità segreta". Ricerche su Ettore Vernazza e i notai genovesi confratelli del Divino Amore in Tra Siviglia e Genova: notaio, documento e commercio nell'età colombiana*, a cura di Vito Piergiovanni, Giuffrè, Milano, pp. 393-434.
- Topi L., 2017, *Forme di controllo in una città "appestata": Roma 1656-1657*, «Eurostudium», 2017, pp. 25-26.

Archival sources

- ASGe, Magistrato della Sanità, 1656, ms.498, *Manuale delle deliberazioni*.
- ASGe, Magistrato della Sanità, 1656, ms. 265, cc.74-76, *Relazione (12 settembre)*.
- ASGe, *Sanità*, n. 1881, 1656, (13 settembre).
- ASGe, Senato Senarega, n. 1092.

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