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TEMA: MATERIALI

TITOLO: I MATERIALI TRADIZIONALI E LA NECESSITÀ DI « COSTANTI » AMBIENTALI NELL'ARCHITETTURA SARDA.

SOMMARIO:

Nelle presenti note sono state sommariamente esposte le principali cause dei degradi ambientali, con particolare riferimento ai problemi di « degrado cromatico », che tanta parte hanno avuto nella valutazione dell'equilibrio compositivo della scenografia urbana.

Ci si è perciò soffermati sui diversi materiali costruttivi (pietre, mattoni crudi ed intonaci) che contribuiscono alla policromia architettonico-ambientale del territorio regionale sardo.

Dalle descrizioni di alcuni viaggiatori dell'Ottocento nell'Isola sono stati tratti i frequenti riferimenti agli aspetti percettivi degli spazi urbani e ai materiali impiegati nell'edilizia tradizionale.

Sono state inoltre localizzate geograficamente le « aree omogenee » d'impiego dei materiali costruttivi: al meridione dell'isola, con la prevalenza dei « laderi » o mattoni crudi, al centro e nel settentrione, con rocce calcaree, lave basaltiche, trachiti e graniti lasciati a facciavista, o a volte intonacati.

Si è così potuto riscontrare la quasi totale aderenza delle sopracitate zone con le aree geografiche da cui vengono estratti tali materiali.

Dall'esame delle diverse tecniche e dei caratteri costruttivi dell'architettura abitativa tradizionale, oltreché dai restauri cromatici dei paramenti murari degli agglomerati urbani, operati dall'Ottocento ad oggi, si è indagato sul complesso fenomeno del « male urbano ».

Dalle risultanze, infine, viene proposto, per i centri maggiori dotati di adeguati strumenti storico-archivistici, l'apprestamento di un *Piano regolatore del colore* sulla base dei documenti e progetti originali dell'edilizia residenziale del secolo scorso, mentre viene suggerita come integrazione per tutto il territorio isolano, la *Carta regionale del restauro*, articolata per zone omogenee secondo classi di preesistenze tipologiche, con cui è possibile fornire precisi suggerimenti compositivi sia per i materiali, con le tonalità cromatiche relative, che per le tecniche costruttive adottabili.

PANU KAILA

THE PRODUCTION AND USE OF PIT BURNT TAR

Ancient tar pits

" And God said to Noah... Make yourself an ark of gopher wood; make rooms in the ark, and cover it inside and out with pitch ". (Genesis 6:13-14).

It seems to be natural to join the origins of tar burning with charcoal pits, i.e. early production of metals. Charcoal pit and tar pit are relative constructions, and as well as some tar comes out from a charcoal pit, so also some charcoal is left as byproduct from a tar pit. In any case it is a question of thousands of years of tradition: the poles of prehistoric dwellings were protected by tar. Plinius told that in Egypt people used tar-water to embalm mummies, tar to protect roofs and ships and evaporated tar or pitch to chink barrels. The method of production varied locally, but for instance Theophrastus described the tar pit of Macedonians as very similar to that used in Finland during recent centuries.

Early tar production in Finland

The technics of tar burning came to Finland along usual ways of cultural influences, on the one hand through Central Europe and Sweden, on the other hand through Russia. In more developed countries with less forest the study of production methods have been more important. The research of burning and planning of equipment remained in German, English, French and Russian hands up to the end of 19 th century.

In the era of enlightenment the scientific academies interested in industries. From that time we have a very interesting document, an academic treatise " The production of tar in Ostrobothnia ", 1747, by Eric Juvelius. (Ostrobothnia is a part of Finland along the eastern coast of Gulf of Bothnia).

This includes both history and practice of tar burning. The author calls himself an Ostrobothnian, and says to have followed tar burning ever since his childhood. Juvelius claims that the skill of tar burning in Ostrobothnia is primeval, so old that its beginning is out of reach. This is proved to him by ancient tar pits, that are either filled with earth or growing with tall old pines. The old pits were however smaller than the present ones, a couple of fathmos (3,5 metres) in diameter and the process of burning was different. Tree tops and branches were used as raw material; these were tied in bunches and set in upright position like when burning charcoal. The tar did not run out of pit, but was gathered in a basin dug in the middle.

One of the interesting details is that people working on the pit never called tar with its proper name, but said only " the stuff ". When Juvelius asked for the reason, he was said that " it wants so ". That was the same type of superstition as with hunters calling the beasts with disguised names or fishermen speaking to their implements with pet names. Juvelius also tells that in very flat areas a tar pit could be built wholly over the ground as a timber construction.

As an economist Juvelius was terrified of the Finnish habit to burn only the tree trunks, i.e. only the barked lenght of some 3,5 metres — the long stumps (the trees were felled with axe in winter over the snow and from pleasant height) and the top halves were left in the forest. Decent forests were already so far from villages that it was too difficult to carry that wood home for timber or firewood. From one trunk about 2 litres of tar was gained. The tar production in Ostrobothnia was in 1745 10 million litres and the annual consumption of forest 5 million trees or about 6000 hectares; No wonder Juvelius recommended the use of stumps and branches, the gathering of pitch from living trees like in Central Europe, and the building of tar furnaces which were recently introduced in Sweden.

The Swedish government (Finland was part of Sweden that time) became seriously worried about this huge waste of forest — at the same time the raising of crops on burnt-over woodland, the new wood-consuming open chimneys instead of smoke ovens and the careless use of timber in building purposes threatened to devastate Finnish forests. The next year the government gave first regulative instruction for tar burning limiting the production and denying barking of healthy big trees for tar.

The production in 19 th century

One hundred years after Juvelius a new remarkable study of tar burning was published: " About tar burning in Finland and how it should

be bettered ", 1862, by Aug. Soldan. The Finnish government sent Soldan to travel around in Finland to study forestry. " I will try to describe thoroughly one of the tar pits, which are 5 to 7 thousand in number in the northern parts of Finland, where their smoke raises every summer over the poor backwoods... ". This description is not much different from the days of Juvelius. Soldan says that to have high quality and good efficiency the pit ought to be big enough: " in tar regions the people know it from experience ". One pit contained usually 100-120 m^3 of wood corresponding some 3000-3600 litres of tar. The tar barrels were carried by boats down the rivers or by horses to the " tar courts " of seaport towns. There the tar-water was let off and the tar was inspected and marked in three classes: fine, middle and thick.

Soldan too is terrified of the waste of forests in tar burning. In his final conclusion he recommended again the use of stumps and branches as raw material instead of barked trunks, and the refining of tar to pitch, pitch oil and turpentine — Soldan mentions that one plant in London uses annually over one million litres of Finnish tar as its raw material. Soldan also propagated tar furnaces so effectively that the first ones were founded in 1860's, without success. Only after a study tour to Russian plants in 1890's the permanent tar destilleries were raised in Finland.

The tar trade

In Finland tar has been one of the first export articles in foreign trade, and as late as in 1815 tar burning is mentioned to be the principal source of livelihood in many parts of Ostrobothnia. The tar from Northern and Western Finland was exported through Stockholm, Eastern Finnish and Karelian tar through St. Petersburg. From Middle Ages on the tar trade played an increasing role in the economical development of Finland.

On the other hand peasants got money from tar for taxes as well as for salt and iron, and on the other hand tar burning was a safe source of incomes also in poor harvest years.

In 17 th century the tar trade became monopoly of special Swedish tar companies, and the tar inspection office was founded in seaport towns in 1641. The tar could be falsified by tar-water mixed with manure, or in winter by makind ice inside the barrel; but Finnish export tar had ever since a high reputation throughout the world. In Swedish " Landtmannabyggnader " (Farmers' houses), 1868, by Löwenskiöld the best tar is still called " Finnish tar ".

The export of tar from Finland was in 1650 10 million litres — the

home consumption should be added — and that of pitch evaporated from tar 0,5 million litres. Later during the best boom periods of 19 th century the export exceeded 20 million litres. The price and thus also the production of tar was always sensitive to conjunctures. During war times the demand raised quickly but then for instance the Continental Blockade in 1806 cut the trade to minimum. In 1860's the American Civil War caused a short upswing, but the war ended so quickly that the forests that were barked with great enthusiasm were left unburnt.

From the beginning of 19 th century the large destillation of coal for illuminating gas gave coal tar and coal pitch as by products, these were worse in quality but cheaper than wood tar. In ship building the development from pine to oak and then to iron reduced the demand of tar, and at the same time the using of wood as saw material and pulp made tar burning less profitable. By the turn of this century the export was 5 million litres, and after a temporary boom caused by the First World War the production declined to 1-2 million litres annually.

Tar-Oil Company

During the Second World War the Finnish Government started to promote tar production as home industry which suited also for invalids, as it was said as an argument. In Ministry of Popular Relief an Office of Tar was founded, likewise a public Tar-Oil Company to help the industry. Tar Law was published in 1944, there the Company promised to buy in guaranteed price all the tar produced. The Government wanted again to spare the forests by giving higher price for stump tar than for trunk tar. Also destillation plants were preferred to tar pits when an extra price for furnace tar was higher than for better pit tar — the by-products like wood gas, turpentine, acetic acid and alcohol are gained in plants. Tar products were refined for heating and lubrication oil, for cars, illumination and paints. It was estimated that the traffic and industry of Finland need annually 10 million litres of tar, and the production raised to 3 million litres by 40 destillation plants.

However the end of war and better times in 1950's ruined the tar industry. Today only one single plant is left, with annual production of 150.000 litres. The burning of tar pits ended, too. During last years only some smaller pits have been burnt in museums and local festivals. The great value of these lies in maintenance of traditional skill of tar burning and in its passing to younger generation.

Production of tar for restoration

The supply of pit burnt tar, which is inevitable for the protection of wooden roofs, has during recent years been difficult and occasional. This fact together with lack of knowledge concerning the care of old roofs has led to destruction of valuable historic roof, has caused expansive renovation bills and has given the wooden roofings a bad reputation for their short age. One of the most difficult problems in the care of our architectural heritage has been the lack of irreplaceable traditional materials. Pit slaked lime, clay mortar, red water paint, pressed linseed oil and pit burnt tar are some of the most badly wanted items.

In autumn 1980 in Ilmajoki, Ostrobothnia, a new effort was started by Uulatuote Ltd to burn tar in large pits with traditional methods. The first test was made with 120 m^3 of stumps from Lapland; the pit is built big enough for 400 m^3. The tar master Matti Laine have learned his skill during five years in Oulu Open Air Museum. The product will be analysed in the State Centre for Technical Research to formulate the qualifications of good tar. The future will show if this brave effort will prove worth while, if the profits of genuine tar is understood by those responsible for the care of wooden roofs.

The process of tar burning

The raw material for tar burning was usually barked tree. Young pines were barked leaving a strip of three inches at the northern side so that the tree would not die immediately.

The tree tries to protect itself by producing pitch coating on the barked surface. The barking was continued after some years as high as a man could reach with a long tool, 3,5 metres, and finally after another couple of years also the strip was barked away. The tree was felled in the next winter and split in small pieces (" too small for an axe handle "), these were piled around the pit to dry in springtime winds. The pit was loaded and burnt usually in June.

The best pit was an old tight one. It was a shallow funnelshaped deepening with a hole in the bottom. The tar ran through this and along a wooden tube down to a cistern outside the pit. The pit was loaded carefully as tightly as possible with wood until a slightly curved dome was formed. Finally the pit was covered with moss and earth. The lighting happened in calm weather, often at night when the watching of it was easiest. The burning demanded great skill and experience, the fire had to advance evenly and with proper speed. During the burning, which lasts up to two weeks, the

fire was carried over and regulated by opening and closing the earthen cover of the pit. This work continued day and night. The meaning was to heat the wood in layers, removing charcoal and tar at intervals, but not to let the wood burn in flames. Sometimes it did happen, with rising wind, that the whole pit was burst into flames and all the work was lost.

During the burning the heat in the pit rises gradually to 430 degrees centigrade. When the wood is heated a dry destillation takes place. The gases are volatilized to the air, the tar is running down with water and wood acid. Later in the barrel the tar-water separates over and the acid under the tar. As rest product some charcoal is gained. The most important substance in the tar is the raw pitch of the wood; this contains resins and turpentine oils.

The use of tar

Tar is a natural product that is irreplaceable as protection of wood. The resins of pitch in tar are wood's own preservation system. The most demanding and today also the most usual usage of tar is the protection of wooden roofings, i.e. the shingle and board roofs. Coal tar is unsuccesful in this task: it hardens quickly and forms a film that is too tight and cracking and so even promotes the rot. The modern rot-preventive chemicals applied by brush result often to the same. Because of a film the decaying of wood underneath may be quicker than without any treatment.

The third substitute for tar is the pressure impregnation, which is usually done with highly toxic salts of arsene, chrome and copper (K 33). The pressure impregnation makes cells of wood fragile, it corrodes nails and makes a later finish with tar more difficult. The worse disadvantage is however that this permanent toxic is little by little getting into the nature when impregnated structures are demolished and burnt. The annual use of K 33 only in Finland goes over 10 million kilos. In many cases (windows, weatherboardings) the use of toxic wood is unnecessary when other means like painting will protect the wood sufficiently. In other cases (piers, poles) the pressure impregnation lengthens the durability of wood up to 3-4 times. Our generation is thus saving money, and pushing the toxication problems to future generations. The tar is natural material that in no way poisons the nature.

The wood can be protected against rot either by letting its cells absorb substance that prevents rotting organisms, or by closing the entrance of water by surface coating. This coating must however breathe and never be a plastic-tight but cracking film. Protection against wearing caused by weather, wind

and sunshine can only be achieved by a surface coating of decent thickness. Tar both penetrates into wood replacing its natural pitch substances and forms a flexible coat on it. The last-named fact is often forgotten when protecting wooden roofs, although only a tar coating makes the wood really durable. This coat rejects water from roof as efficiently as from the bottom of a boat. It may crack in winter, but softens in the next warm weather and closes the surface again. It is good to remember that tar was also used with success to protect iron parts from corrosion; here the protection is caused only by water repellent coating.

Tar on wooden roofs

The reason of the decay of a wooden roofing is the neglect of proper tar coating. The aim is at first to absorb wood with tar as thoroughly as possible, and then to form a tar coating which will be maintained continuously.

New shingles or boards are soaked in heated tar for half an hour. Old worn roofing is brushed strongly with stiffbristled tar brush during warm weather and preferably using heated tar for better penetration. The wood must always be absolutely dry. In absorption the fresh and thin tar will do best. The consumption is great, about 1 litre for 1 m^2.

After that a tar coating is formed by brushing the tar on roof during cold (but never wet) weather in autumn. The thick tar will then stick on the roof and becomes during the winter even more pitchy and solid. The brushing is renewed annually in autumn until a permanent coating is attained. On northern side this will be ready after a couple of times, on south side more work is needed. The amount of brushings depends on the condition of the roof, the quality of its material, the steepness of the slope, the point of the compass and so on. The continuous care of a ready tar coating means a new brushing at longer intervals, on south side between some 5 years, on north side between 10-20 years. For coating an old and thickened tar is excellent. The consumption is about 1 litre for 2-6 m^2.

The experiences prove that pit burnt tar of high quality is the best material for protecting a wooden roof. The more refined destillated tar is not as good. No other materials can be recommended, nor pressure impregnation. A wooden roof of good quality, properly coated with tar, will last for centuries.

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THEME: MATERIAUX

TITRE: LA PRODUCTION ET L'UTILISATION DU GOUDRON CARBONISE EN FOSSE.

RESUME:

La fosse à goudron a la forme d'un entonnoir dont le fond en argile à été durci avec du goudron. Elle est chargée de morceaux de pin poisseux, soit de troncs écorcés depuis longtemps ou de souches. La fosse est recouverte de terre, puis on allume le feu qui brûle lentement pendant deux semaines jusqu'à ce que le goudron sorte du bois et qu'il ne reste qu'un peu de charbon.

La production du goudron finlandais, qui constituait un important marché dépassant 20 millions de litres annuellement pendant les meilleures années du 19e siècle, semblait disparaître finalement dans les années 1950. La compagnie Uulatuote d'Ilmajoki, Ostrobothnia, a commencé une nouvelle production en 1980 pour assurer l'entretien et la restauration des toitures en bois des églises et des musées. La première fosse d'essai contenait 120 m^3 de souches de Laponie. Le produit obtenu sera analysé pour en déterminer les propriétés.

Le goudron carbonisé en fosse est un produit naturel irremplaçable pour la protection des toitures en bois. Il pénètre dans les cellules du bois pour prévenir la pourriture et il forme une couche protectrice flexible sur la surface. On obtient une pénétration accrue en plongeant les bardeaux neufs dans le goudron chaud ou en badigeonnant par temps chaud les vieilles couvertures usées. On complète la couche protectrice en répétant le badigeonnage par temps froid mais sec à l'automne. La maintenance est assurée en badigeonnant la face sud de la couverture tous les 5 ans et la face nord tous les 10 ou 20 ans. Une bonne couverture en bois, correctement recouverte de goudron, durera pendant des siècles.

NAME: PANU KAILA - Architect, National Board of Historical Monuments - Finland.

SUBJECT: MATERIALS

TITLE: THE PRODUCTION AND USE OF PIT BURNT TAR.

SUMMARY:

The tar pit is a shallow funnel-shaped deepening with bottom of clay hardened with tar. It is loaded with pitchy pieces of pine, either trunks barked for years, or stumps. The pit is covered with earth, set in fire and burnt slowly up to two weeks until tar turns out of wood and only some charcoal is left.

The Finnish tar production, which was a big trade reaching over 20 million liters annually during the best years of 19 th century, seemed to die finally in 1950's. For restoration and maintenance of wooden roofs of churches and museums a new production was started in 1980 in Ilmajoki, Ostrobothnia, by Uulatuote Ltd. The first test pit contained 120 m^3 strumps from Lapland, The product will be analysed to formulate the properties.

Pit burnt tar is an irreplaceable product of nature in the protection of wooden roofings. It both penetrates into cells of wood preventing rot, and forms a flexible coating on the surface. The penetration is gained by soaking new shingles or boards into hot tar, or by brushing the worn old roofing in warm weather. The coating is then formed by repeated brushings in cold but dry weather in the autumn. It is then maintained by brushing the south side with intervals of some 5 years and north side 10-20 years. A wooden roof of good quality, properly coated with tar, will last for centuries.

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TEMA: MATERIALES

TITULO: LA PRODUCCION Y USO DE ALQUITRAN OBTENIDO EN HORNO

SUMARIO:

El horno para obtener alquitrán es un hueco poco profundo en el terreno, que tiene la forma de embudo, cuyo fondo es de arcilla endurecida con alquitrán. Se carga con pedazos de pino resinoso, ya sea en forma de troncos descortezados con años de anticipación, ya sea en forma de leños. El horno se cubre con tierra, se enciende y se deja arder lentamente por dos semanas, dejando que el alquitrán fluya de la madera hasta que solo quede carbón.

La producción de alquitrán en Finlandia, fué una gran industria que en los mejores años del siglo XIX alcanzó los 20 millones de litros anuales, pero que finalmente desapareció en la década de los años 50. Para la restauración y mantenimiento de techos de madera en iglesias y museos, la empresa Uulatuote Ltd. inició nuevamente la producción en 1980, en la ciudad de Ilmajoki, Ostrobothnia. La primera horneada de prueba, se hizo con 120 m^3 de leños procedentes de Laponia. El producto será analizado para certificar sus características.

El alquitrán obtenido en horno, es un producto natural irremplazable para proteger las techumbres de madera. Este material penetra entre las células de la madera, previniendo la putrefacción, y forma a la vez una capa flexible que protege la superficie. La impregnación se logra sumergiendo el tejamanil o tablones en el alquitrán caliente, o barnizando los techos antiguos durante la estación de calor. La capa protectora se logra dando varias manos con brocha en los días fríos, pero secos, del otoño. El mantenimiento se hace barnizando las superficies que dan hacia el Sur cada 5 años, las que miran al Norte, cada 10 o 20 años. Una techumbre de madera de buena calidad, debidamente protegida con alquitrán, podrá durar siglos.

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Предмет : Материалы

Название : ПРОИЗВОДСТВО И УПОТРЕБЛЕНИЕ СМОЛЫ ОБОЖЖЕННОЙ В ЯМЕ.

Краткое Описание : Смоляная яма, это неглубокое, воронко-образное углубление. Его глинистое дно просмолено для большей твердости. Яму нагружают смолистыми кусками сосен или давно забракованных стволов и пней. Яму покрывают землей, ее поджигают и огон горит в ней медленно до двух недель, до тех пор пока смола не вытечет из дерева и остается только древесный уголь.

Финнское смоляное производство смолы, которое позволяло вести большую торговлю, достигающую до двадцати миллионов литров ежегодно в лучшие годы девятнадцатого столетия, стало в конце концов вимирать в 1950ые года. В 1980 году была начата новая продукция в Ильмажоки, в Остроботнии, Компанией Уалототе, с целью реставрации и поддержания деревянных крыш, церквей и музейев. Первая пробная яма содержала 120 кубических метров привезенных пней из Лапландии. Продукт будет подвержен анализу, для качественной формулировки.

Смола обожженная в яме есть незаменимое природное вещество для обслуживания деревянных крыш. Она проникает в древесный клетки и также предотвращает гниение и создаёт гибкое покрытие поверхностей кровель. Проникновение смолы улучшается погружением новых гранок или кусочьков дерева в горячую смолу, или же покраской старых кровель в теплую погоду. Покрытие кровель смолой производится повторением этого процесса в осеннюю погоду, холодную, но сухую. Поддерживают его покраской южной стороны каждые пять лет, а северную сторону красят каждые 10 - 20 лет. Доброкачественная деревянная крыша хорошо покрытая смолой может служить столетиями.

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TEMA: MATERIALI

TITOLO: LA PRODUZIONE E L'USO DI CATRAME CALCINATO IN FOSSA.

SOMMARIO:

La fossa per calcinare il catrame è una buca poco profonda a forma di imbuto con il fondo di argilla indurito dal catrame. Si riempie di pezzi di pino resinosi o di tronchi scortecciati da anni o di ceppi. La fossa è ricoperta di terra; il fuoco acceso è lasciato bruciare lentamente per circa due settimane finché il legno è consumato e resta solo un po' di carbone.

La produzione finlandese di catrame — che durante gli anni migliori del secolo XIX fu un'industria importante, con un prodotto di 20 milioni di litri annuo — sembrava essersi definitivamente estinta negli anni '50. Per il restauro e la manutenzione dei tetti lignei delle chiese e dei musei, una l'Uulatuote Ltd. Per la prima prova 120 m^3 di ceppi dalla Lapponia sono stati messi nella fossa. Il prodotto sarà in seguito analizzato per determinare le qualità.

Il catrame calcinato nella fossa è un prodotto della natura insostituibile per proteggere i tetti di legno. Esso penetra dentro le cellule del legno impedendone la putrefazione e fornendo anche un rivestimento flessibile sulla superfice. La penetrazione è ottenuta immergendo le nuove assicelle di copertura o nuove tavole nel catrame caldo, o dipingendo il vecchio tetto consumato durante la stagione calda. Il rivestimento si forma poi tramite ripetute pitture in autunno quando il tempo è freddo ma secco. Si mantiene successivamente ridipingendo il lato sud ad intervalli di circa 5 anni e il lato nord ogni 10-20 anni. Un tetto di legno di buona qualità correttamente rivestito con catrame, durerà per secoli.