(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 January 2008 (10.01.2008)

PCT

(10) International Publication Number
WO 2008/003146 A2

(51) International Patent Classification:
A61B 5/103 (2006.01)

(21) International Application Number:
PCT/BE2007/000071

(22) International Filing Date: 2 July 2007 (02.07.2007)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:

2006/0361	3 July 2006 (03.07.2006)	BE
2007/0218	9 May 2007 (09.05.2007)	BE

(71) Applicant and
(72) Inventor: **KARAVANI Ilan** [BE/BE]; Albertstraat 27, B-2018 Antwerpen (BE).

(74) Agents: **DONNÉ, E.** et al.; Bureau M.F.J. Bockstael nv., Arenbergstraat 13, B-2000 Anzwerpen (BE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

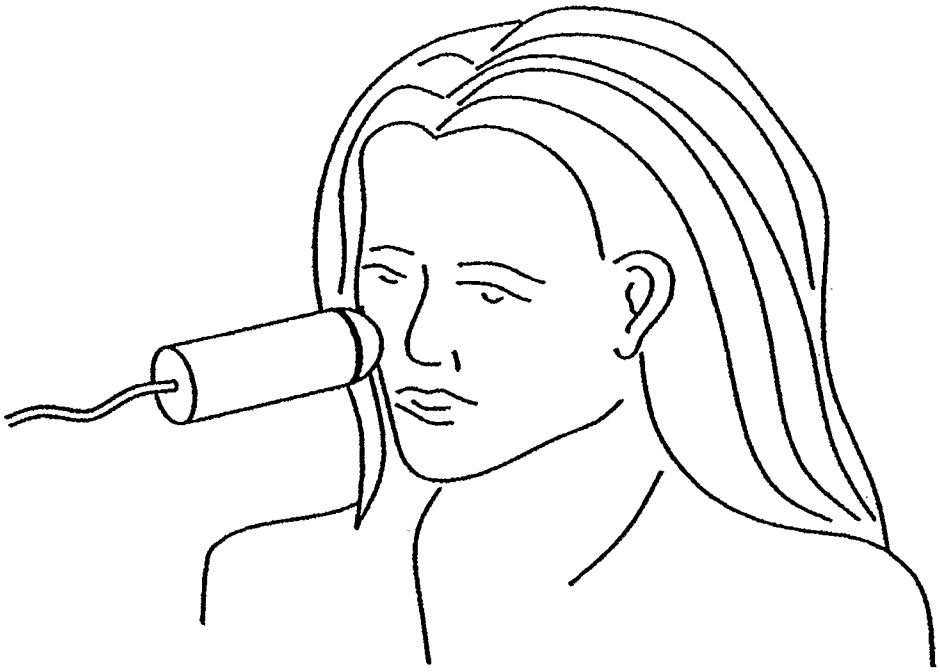
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** METHOD FOR DETERMINATION OF THE TYPE OF SKIN OF THE FACE OF A PERSON AND METHOD FOR THE DETERMINATION OF THE AGING OF THE SKIN OF PERSON' S FACE.



(57) **Abstract:** Method to determine a person's facial skin type in a standard manner, characterised in that the skin types are represented in figures by taking into account a selection of measurable parameters.

WO 2008/003146 A2

Method for determination of the type of skin of the face of a person and method for the determination of the aging of the skin of person's face.

The present invention concerns a method to determine a person's facial skin type.

It is known that the facial skin differs from one person to another. This is even apparent to the layman when simply looking at someone's face.

Every face has its own specific care requirements, as far as cosmetics are concerned as well as the intake of food and supplements and of course also medical care.

Classifying the skin in skin types makes it possible to anticipate the required specific care in a practical manner.

The oldest and most well known classification in skin types is that of cosmetics icon Helena Rubinstein, who classified the face in 4 types: dry, oily, mixed and sensitive.

Later, the skin types were divided more accurately in 4 new types on the basis of 2 criterions. The first criterion takes into account the fat content at the surface of the skin, namely oily skin (O of Oily) versus dry skin (D of Dry). The second criterion reckons with the sensitivity of the skin, namely sensitive skin (S of Sensitive) versus resistant skin (R of Resistant). This gives us 4 types (OR-OS-DR-DS).

Two additional criterions have been developed to determine important elements for the skin typology, i.e. the degree of pigment shifting that gives the skin a speckled appearance (pigmented P versus non-pigmented N), and the degree of aberrant skin structure that is visible as wrinkles being formed (wrinkled W versus tight T).

The combinations of these 4 criterions give 16 types in total (2x2x2x2) O/D - S/R - P/N - W/T.

This classification is entirely based on a questionnaire. This requires an active participation of the person involved, and the answers are often a subjective interpretation based on the person's point of view. Moreover, it is not possible to quantify the skin type, nor to make a quantitative evaluation or a comparison of the results of a skin treatment. There is no document available in which the data can be univocally recorded.

Attempts have been made to measure different skin parameters by means of instruments, but up to now we have no standard skin image that could result in a skin type system.

The present invention aims to remedy the above-mentioned and other disadvantages and to this end consists of a method to determine a person's facial skin type in a standardized manner, whereby the skin types are represented in figures by taking a selection of measurable parameters into account.

The determination of skin types according to the invention is

based on EXACT MEASUREMENTS of known skin parameters, and thus results in a quantifiable value, as opposed to other methods that make use of questionnaires. Answering questions leads to a subjective interpretation of the skin, and moreover the wrong answers may be given. The results of measurements can be compared, such that it becomes possible to determine any evolution in the skin's condition, which is not feasible by means of questionnaires.

The number of parameters in this code can be extended to for example SIX PARAMETERS and thus it provides a much more clear and complete image of the skin's condition than other skin type determining methods.

Every measurement of a skin parameter is divided into categories according to resemblance, within which category the parameter values may be regarded as equal. Thus, depending on the moisture content, the skin can be divided in two categories: a first "LOW" category of 0% to 49% water, or a second "HIGH" category of 50% to 100%; or the skin can also be divided in ten categories, depending on whether the moisture content is 0-9%, 10-19%, 20-29%, ... or 90-100%.

Supposing that we use a division in **5** categories (0, 1, 2, 3 and 4) for the first five parameters (O, D, S, P, W), and a division in **6** categories for the last parameter (F), the number of skin types is at once OxDxSxPxWxF or 5x5x5x5x5x6 = 18,750 skin types.

This is what makes this skin typification method in the form of a numeric code so accurate.

A direct consequence is that appropriate cosmetics and food supplements can be recommended with a large degree of certainty. The use of the skin type code enables the consumer to make a goal-oriented purchase, even via the Internet. On specialised sites, the products for skin treatment are classified according to skin type. After you have inputted a personal code, the site will only show those products that are appropriate for that particular skin type.

According to the preceding typology, a "dry skin type" could indicate a lack of moisture as well as a lack of sebum. Even a defective skin barrier may be regarded as a condition of dryness.
Three major cream groups may be recommended in this case, depending on the origin of the problem:

- non-oily moisturizing creams in the case of a lack of moisture;
- oily occlusive creams in the case of a lack of sebum;
- barrier-repairing and soothing creams in case of a defective barrier.

The wrong choice may lead to irritations, acne or simply disorders.

The present typology gives a clear indication about what cream is required and to what extent the treatment should be intensified. After the treatment, the skin can also be evaluated by means of repeated measuring.

Also advice regarding cosmetic skin treatments (such as with lasers and peelings) and medical treatments of skin disorders can be backed up by this accurate typology. Thus, it is possible to determine what type of laser is appropriate for the removal of moles or rosacea by means of the new typology, which has not been possible with the preceding methods.

According to a preferred application, the method to that end comprises steps to determine one or several of the parameters, such as sebum content, moisture content, sensitivity, possible presence and concentration of moles and of aberrations in the skin structure and skin colour, whereby the above-mentioned parameters must be measured in specific areas in the face, and whereby, in order to measure each of the above-mentioned parameters, a standardised measuring method is used, such that the result of every measurement can be translated in a figure or code, such that the different measured results can be transformed in a general result in a standardised manner which corresponds to a skin typology requiring a specific treatment.

New knowledge about the skin parameters to be measured in the face has resulted in the above-mentioned skin typology determination method. This method can be used to diagnose and follow up the condition of the skin and to recommend treatments.

The present invention also concerns a method to determine the facial skin ageing, which mainly consists in determining the partitional homogeneity of a parameter in the skin surface or skin tissue of at least a part of a person's face, whereby the

homogeneity is taken as a measure for the skin ageing, and whereby the homogeneity decreases as the skin ages.

The above-mentioned parameters are preferably skin grooves in the surface of the skin and/or moles and/or blood vessels in the skin tissue.

Extensive research has shown that the above-mentioned method makes it possible to make a good assessment of a person's facial skin ageing.

An advantage thereof is that persons, after their facial skin ageing has been determined, can be subjected to a cosmetic or aesthetic treatment in order to slow down the ageing of the skin.

All the elements regarding the method to determine the facial skin ageing are described in BE 2006/0361, whose content is incorporated in the present patent application by means of references.

In order to better explain the characteristics of the present invention, the following preferred methods according to the invention for determining a person's facial skin type are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 illustrates images of the facial skin being recorded;

figure 2 represents a computer displaying the recorded images;

figure 3 represents the recorded image of the skin to a larger scale;

figures 4 and 5 represent a view identical to that in figure 3, but after the image has been processed;

figures 6 to 10 represent graphical image analyses to determine the skin ageing according to a known method;

figure 11 represents another image analysis to determine the skin ageing according to a known method;

figures 12A and 12B schematically represent different zones of the face;

figures 13 and 14 represent two alternative image analyses, analogous to the image analysis as represented in figure 11;

figure 15 represents a strongly enlarged and computer-processed image of a part of the skin surface of a young skin;

figure 16 is a statistical representation of the variations in skin colour as represented in figure 15;

figures 17, 18 and 19, 20 represent the same views as the respective figures 15 and 16, but each time for an older skin;

figure 21 represents a detail of the processed image recording of a young skin;

figure 22 represents a detail of the processed image recording of an old skin;

figures 23 and 24 represent skin grooves indicated in figures 21 and 22 in the image recording of the skin;

figure 25 represents a strongly enlarged, computer-processed image of a part of the skin surface of a young skin;

figure 26 represents a strongly enlarged, computer-processed image of a part of the skin surface of an old skin;
figures 27 and 28 are statistical representations of the variations in the skin surface represented in figures 25 and 26.

*

* *

The selected skin parameters that are considered as relevant according to the invention to determine the skin type are:

a. **Sebum content** on the skin surface. It is directly related to the skin's capacity to excrete sebum via the sebaceous glands. These sebaceous glands open at the skin's surface in the form of visible, small holes, called pores.
b. **Moisture content.** It is directly related to the skin's capacity to maintain moisture in the upper part of the epidermis, which in turn depends on the composition and structure of the skin cells.
c. **Sensitivity.** It depends on to what degree the skin barrier is permeable, both to bodily fluids evaporating from the inside to the outside, as to external substances wanting to penetrate the skin barrier from outside. The sensitivity also depends on to what extent the skin reacts to internal changes and external stimuli.

d. **Moles.** These pigment shiftings in the skin serve to measure the skin's capacity to produce moles as a result of internal stimuli or external skin damage. This quality is genetically

determined and is part of the skin type, but it is also in proportion to the degree of skin damage.

e. **Aberrations in the skin structure.** These are a measure for the intrinsic skin ageing (as a result of age) and extrinsic skin ageing (as a result of external causes, mainly sun damage, alcohol, smoking and hormone relapse). They can first be measured as aberrations in the microstructure in enlargements, and in an advanced stage they are visible to the bare eye as wrinkles.

f. **Skin colour.** This parameter is crucial in the knowledge about the skin type for various diagnoses and treatments. Moreover, it is an indirect measure for pigment shifting (which is often seen in darker skin types) or sun damage (which is often seen in lighter skin types). Depending on the complexion and reaction of the skin to exposure to the sun, the skin colour is divided in 7 phototypes according to Fitzpatrick's general classification system, being O-I-II-III-IV-V and VI. Phototype 0 has no pigments at all and is better known as an albino. Phototype I has ginger hair, freckles in a pale complexion, always gets a sunburn and never tans. Phototype II has blond hair, a pale skin colour, always gets a sunburn but sometimes colours pale brown. Phototype III sometimes gets a sunburn but tans gradually. Phototype IV seldom gets a sunburn, tans more and more and is of the Mediterranean type. Phototype V seldom gets a sunburn, tans very fast and is typical for Indians, American Indians, people from the Arabian peninsula and Asians. Phototype VI never gets a sunburn,

gets a very dark tan, and is of the black skin type.

g. **Elasticity.** This parameter is a measure for the deformation capacity of the skin when exposed to a pre-determined stretching force and the speed at which the skin reassumes its original shape as soon as said force stops. This parameter is measured with an elastometer. Incorporating this parameter in the skin type determination would increase the length of the measurements and multiply the number of skin types with an additional factor (x5). This disadvantage is not in proportion to the contribution that is offered to the ultimate cosmetic advice. For specific studies in which the elasticity may be particularly useful, this parameter will be used in addition to or instead of other parameters.

h. There is no restriction to the number of parameters that can be determined in the future, as long as the parameter renders the selected quality of the skin in a relevant way. It is possible to develop a customized code by implementing different levels and different parameters, depending on what is aimed. Thus, there are codes for screening the menopause skin, for screening sun damage in children, for screening smokers or to advise on food elements.

*

* *

In order to measure the above-mentioned parameters in a

standardised manner, the method according to the invention makes use of the following instruments.

a. **Sebutape**. Sebum is the fat content in the skin. It is measured by putting a fat-absorbing strip on the skin for 10 seconds. The absorbed fat makes the strip transparent in a specked manner. This is read by an optical reader that analyses the spots in the image. The total surface sum of the spots per surface unit is a measure for the skin's fat content. The result is given in microgram/cm^2.

b. **Hydration meter** or hygrometer. The hydration of the epidermis (upper layer of the skin, about 50 micron thick) is measured by an electronic system that measures the skin's capacitance as a measure for a hydrated skin. Hydration is represented as % moisture.

c. **Trans Epidermal Water Loss (TEWL) meter**. The moisture under the skin evaporates in two ways, i.e. via perspiration (or sweating) and the continuous evaporation of moisture via the epidermis (surface layer of the skin). The latter is a measure for the integrity of the skin barrier. The higher the TEWL, the more fragile the skin barrier. This is measured by means of a hollow cylinder with two sensors that are sensitive to the moisture content in the air. The distance between said sensors is large enough to measure a moisture gradient. The evaporation is represented in grams per hour per 10 m^2. A built-in thermometer is used to measure the skin's temperature and to possibly correct the TEWL value should the skin's temperature deviate considerably from the normal 30°C +/- 2°C. The value is expressed in degrees

Celsius.

d. Digital image of the skin structure with non-polarized light.

The digital camera makes a simple, non-invasive, digital image recording of the skin surface (figure 1), followed by a direct image processing by a computer (figure 2). Under a standardized, oblique exposure, the skin grooves become visible as dark shadows (figure 3). The image is transformed in grey densities (GL or grey level) that correspond to the differences in level of the skin structure. The darker the grey level (GL), the deeper the groove. The darkest pixels correspond to the deepest grooves.

When processing the image with the computer, it is possible to draw a network over the skin grooves that follows the pattern of the microstructure (figure 4). This network can be isolated from the background and, if necessary, it can be emphasized by assigning a greater pixel value to the pixels of the network (figure 5).

A computer analysis of the grey levels provides an evaluation of the skin texture according to the following parameters:

(a) the total length of the skin grooves in the measured surface, also called the density of the skin grooves or simply the density, represented in mm/mm^2.

(b) the grey levels over the entire surface that are divided in peaks (light zones) and valleys (dark zones), calculated in relation to the average grey level and to which

the following calculations apply:

- the surface covered by the peaks (figure 6) and the valleys (figure 7); the sum of both irregularities, also called the roughness (Ra) (figure 8), which is a measure for the roughness of the skin surface, expressed in terms of grey levels (GL);
- the average height of the peaks (Rp), the valleys (Rv) and the total height of both (Rt) is a measure for the relief (figure 9), expressed in terms of grey levels (GL); and
- the average distance between the peaks (Sm) represents the distance between the lines of the network in micrometers (figure 10).

The orientation of the skin grooves is assessed by means of the network, corresponding to lines that follow the darkest grey levels on the screen.

The orientation of the skin grooves in this network is plotted in a circular graph, called the distribution rose. The cumulated lengths of all the skin grooves having one and the same orientation (i.e. direction) is represented as a line going through a circle of 360°.

The length of this line is a measure for the total length of the skin grooves in that particular orientation. The different orientations of the cumulated grooves form a roselike figure (figure 11).

The latest software developments are based on what are called "neural networks" or artificial intelligence. They can

"recognize" images and patterns as if it were, and also assign a value to them without having to carry out all the aforesaid measurements. In this context, the calculations demonstrated here, based on Java programming (Sun inc.), should also be seen as one of the possibilities for quantifying the described patterns in an image. Every other quantification method, including the "neural networks", is possible as well. The present invention aims to analyse the skin parameters, to interpret and describe them and to correlate them to the skin aberrations concerned that have a practical application in a skin type encoding.

e. Digital image of the skin colours with polarised light.

A digital camera with oblique exposure and a polarisation filter, required to observe colour differences (polarised light). According to an alternative method of the invention, the same images are taken with polarised light, such that any reflection of the light by the skin surface is excluded and such that an in-depth view of the skin tissue is obtained, where the pigment and blood vessels are situated. The pigment and blood vessels partly determine the colour of the skin. Any other form of exposure (such as Ultra Violet A exposure for pigment detection) or any other type of sensor (such as an Infra Red sensitive sensor for detecting the blood vessels via heat radiation) can also be used here to show the presence of pigment and/or blood vessels.

A whole series of lenses can be used for these measurements, starting from 200x to 10x objectives. Two lenses in particular soon appeared to give reliable measurements, namely those with an enlargement factor of 50 and 30.

Tests with a 50x lens and a 30x lens were carried out on all 13 zones of the face with different test subjects of varying ages. The measured skin surface for the 50x lens amounts to 25.9 mm^2 and the measured skin surface for the 30x lens amounts to 72.0 mm^2. Several images were made with the polarised light as well as with the oblique exposure with the 50x lens, and just as many images with the 30x lens. Averages and standard deviations indicate more reliability (smaller dispersion of the measurements) for the measurements made with the 30x lens, and this for the measurements of the micro relief as well as for the measurements of the blood vessels and pigment.

As is known, also other exposure methods can be applied to represent the skin relief.

In the case of very young persons with a healthy skin, the face is a homogeneous surface. The measured parameters differ hardly or not at all from one another in the different zones. As aberrations arise (such as a dry skin, oily skin or sensitive skin) the difference between the measured parameters for the different zones increases. The value of the parameter concerned is no longer evenly distributed over the face as a whole. As a result, the face can be divided in different zones that are different from one another as far as the parameters are concerned.

The above-mentioned measurements are for example carried out in different specific zones of the face according to a preferred application.

In order to define appropriate and reliable facial zones, the face is subdivided in 13 anatomical zones that show a certain likeness as far as structure is concerned (figures 12a and 12b). This subdivision is based on skin measurements and their analyses.

Zone 1	the glabella
Zone 2	the nose
Zone 3	the upper lip
Zone 4	the lips and lip edge
Zone 5	the lower lip
Zone 6	the chin
Zone 7	the medial jaw
Zone 8	the medial cheek (subdivided in upper part 8a and lower part 8b)
Zone 9	the eye contour
Zone 10	the forehead
Zone 11	the temple zone
Zone 12	the lateral cheek
Zone 13	the lateral jaw

The following measurements were carried out on all 13 zones, with persons of varying age groups from babies to elderly persons; measurements of the skin structure with an oblique exposure; measurements of the pigment and blood vessels with polarised light; measurements of sebum with the sebum strip; measurements of the TEWL (and temperature) and of the hydration with a combined measuring probe.

The results were assessed on reliability and repeatability of the measurement and the distinctiveness

(representativeness) of the measurement for the parameter concerned in this zone.

Said zones are unique as such and innovative, since each of the aforesaid relevant parameters (O/D,S,P,W,F) provide information about the skin in a unique way with zones of minimal and zones of maximal expression. Consequently, these parameters can only be measured well in a single or merely a few facial zones. Defining what parameter should be measured in what zone is part of the invention.

*

* *

The right measurement in the right facial zone, linked to the right interpretation, provides a clear measure for each of the six skin parameters concerned.

Standardisation of the measuring method in practice.

Under ideal circumstances, it is advised to carry out the measurements on a person who does not wear any make-up and has cleansed his/her face for the last time and/or applied a hydrating cream more than three hours ago. The environment in which the measurements are performed may play a role. The person should preferably stay in a room at a constant temperature (about 19°C) and humidity level (45%) for at least half an hour before the measurement is carried out.

Naturally, this is not very feasible in daily practice. That

is why measurements were seldom used to determine a skin type, as the absolute values are a random indication that may fluctuate depending on the circumstances (stress, perspiration, etc.) and as a consequence are unreliable. Statistics of the average absolute values for a large population are well known, however, and offer a guideline for the prevailing standard.

The present innovative method aims to remedy disadvantages as described above by making use of two different measuring methods.

Firstly, relative values instead of absolute values will be determined by comparing two identical measurements for one and the same parameter, but in different facial zones, namely a zone having a high expression and a zone having a low expression of the parameter concerned. Secondly, the findings of the physical-chemical sensors (sebum, hydration and TEWL) are correlated to the visual findings for that same parameter of the skin.

A. Relative values between two measurements.

The face is not a uniform surface, and all the described parameters vary depending on the measured zone. Comparing identical measurements in different zones (the high expression zone compared to the low expression zone) results in relative values that tell more about the type of skin than the absolute values. The relation between a measured value in zone X and in zone y is characteristic of the skin type.

Sebum content. The sebum producing capacity is the highest in zones 10 and 2 (forehead and nose) and it is the lowest in zone 8b (cheeks). The sebum content is measured in zone 8b and zone 10, and the values are compared to the known statistical values of a large reference group. A dry skin has low values in both zones. An oily skin has a high value in both zones. A mixed skin has a high value in zone 10 and a low value in zone 8b. The ratio between the measurement in zone 8b and in zone 10 gives the relative sebum value.

Moisture content. The upper skin's capacity to retain moisture is low in zone 13 and higher in zone 8b. The moisture level is measured is measured in zone 8b and in zone 13, and the values are compared to the known statistical values of a large reference group. A low value in both zones indicates a low moisture content. A high value in both zones indicates a good moisture content. A low value in zone 13 compared to zone 8b indicates a mixed type. The ratio between the measurement in zone 8b and in zone 13 provides the relative moisture content.

Sensitivity. The skin's capacity to act as a protective buffer between the inner world and the outer world. This is traditionally measured by means of the Trans Epidermal Water Loss (TEWL) as a measure for the skin barrier. A permeable skin barrier lets more moisture coming from the deeper skin layers evaporate at the surface. Two humidity sensors situated at a distance of 1 cm from one another measure the humidity level and thus determine the evaporation degree. A high TEWL value is a measure for the sensitivity. The

TEWL is usually high in zone 8b, moderate in zone 13 and particularly low in zone 10. The TEWL is measured in zone 8b and in zone 13, and the values are compared to the known statistical values of a large reference group. A low value in both zones is an indication of a good skin barrier and a skin that is little sensitive. A high value in both zones is an indication of a very sensitive skin. A high value in zone 8b and a low value in zone 13 is an indication of a medium sensitive skin. The ratio between the measurement in zone 8b and in zone 13 indicates the relative sensitivity.

B. Correlating the physical/chemical qualities of a skin parameter to visual findings.

Apart from the physical/chemical measuring instruments, also visual parameters are used that provide additional control over the parameter concerned, which increases the reliability of the measurements.

Sebum is excreted by the sebaceous glands. These glands open at the skin's surface in the form of visible, small holes, also called pores. The more numerous and the wider the pores are, the more sebum is excreted. In a digital image of the skin's surface made with non-polarised light, these pores can be quantified and serve as an additional measure for the excretion of sebum by comparing the values to the known statistical values of a large reference group. Thus, the results of the sebum strip can be correlated to the results of the digital images of the pores, which gives an additional idea of the sebum excretion.

Moreover, it is possible to compare relative values here as well. Most pores are found in an image of zone 1, somewhat less pores in that of zone 8a, and the least pores are found in the image of zone 8b. A comparison of these three zones with the known statistical values of a large reference group in the field of pores provides an additional measure for the skin's sebum content.

Hydration level. It is measured on the skin's surface (epidermis). A healthy skin has a large capacity for retaining moisture. In an image of the skin surface under non-polarised light, the skin's hydration level can be derived from the orientation of the microstructure, indicated by the distribution rose. In a well hydrated skin, the image of the microstructure shows grooves that are oriented in more than one direction, whereby preferably two directions are at right angles to one another, also called isotropy. In the distribution rose, this is represented as a cross (figure 13).

A dehydrated skin, however, loses its crossed, rhombic structure to finally end up in a one-way orientation of the skin grooves, also called anisotropy. In the distribution rose, this is represented as a flat curve (figure 14).

Anisotropy and isotropy are also represented in figures in an index, called the "anisotropy index". An anisotropy index of 0% is a perfectly circular rose with a fine distribution in all directions. An anisotropy index of 90% is a perfectly flat rose with only one line going in one direction.

Thus, a non-hydrated dry skin is characterised by a high degree of anisotropy. There is a clear one-way orientation of the skin structure, both with babies and with adults. We can see that the network is less dense, and further there is a lower Ra, a lower Rt and a large distance between the skin grooves, which is reflected in a higher Sm. The TEWL is high and the hydration low. There is little correlation, however, to the sebum content or the temperature.

A healthy, hydrated skin, however, is characterised by an explicit microstructure (higher density, higher Ra and Rt, and smaller Sm), on condition that the image was made of a skin surface that has no wrinkles.

Hydration can be obtained with a conventional hydrating cream of the O/W (Oil in Water) type, twice a day during two weeks. Initially, the hydration level will increase almost immediately, followed by a gradual but clear drop of the TEWL in the following days. Both values finally stabilise after a lapse of two weeks, whereby the decline of the TEWL is the most constant parameter of both. The distribution rose broadens and represents a high degree of isotropy. The density of the skin structure rises (larger number of lines in mm/mm^2). The Ra increases, the Rt increases and the Sm is reduced. This indicates that the microstructure is denser and moreover has an explicit profile with higher peaks, lower valleys and a higher roughness level of the skin surface.

These insights strongly differ from the way of thinking applied until now, whereby a smoothing of the

microstructure is linked to rejuvenation, as opposed to the present findings whereby a pronounced microstructure is regarded as a measure of a healthy, hydrated skin.

The former manner of thinking and methods of analysis do not reckon with the TEWL when evaluating the hydration of the skin, whereas it turns out to be an essential parameter. The sebum content, much appreciated in the past, now turns out to have no evident influence on the skin structure. There is no evident correlation to the temperature.

Thus, the conventional measures for age turn out to correspond more to the hydration level of the skin.

Naturally, direct hydration via the application of creams is important, but there are clear indications that such changes in the microstructure also occur after an inner metabolic change such as the hormonal cycle of the fertile woman.

Thus, all these findings are not only useful for an evaluation in figures of the skin ageing, but they can also be used as a parameter when determining and evaluating the cosmetic and aesthetic skin care.

In an image of the skin surface made with non-polarised light, this microstructure can be quantified and serve as an additional measure for hydration.

A relative value can be obtained here as well by comparing the image of the microstructure of zone 8b and of zone 13 to statistical reference values. A flat distribution rose in

both zones indicates a low hydration. A round rose in both zones indicates a good hydration. A flat rose in zone 13 compared to a round rose in zone 8b indicates a mixed type. The ratio between the measurement in zone 8b and in zone 13 provides the relative moisture content.

Sensitivity of the skin. Apart from a permeable skin barrier, the sensitivity of the skin also translates itself in expanded blood vessels and redness in the zone concerned. In an image taken with polarised light, this redness can be quantified and serve as a measure for the sensitivity apart from the TEWL as a physical value for this parameter. The redness is usually high in zone 8b, moderate in zone 13 and particularly low in zone 10. A relative value can be obtained here as well by comparing the images of the redness in zone 8b and in zone 13. A low value in both zones is an indication of a little sensitive skin. A high value in both zones is an indication of a very sensitive skin. A high value in zone 8b and a low value in zone 13 are an indication of a medium sensitive skin. The ratio between the measurement in zone 8b and in zone 13 is an indication of the relative sensitivity.

A series of patterns in the digital images that have not been discussed here also have a meaning, such as the reflection of the non-polarised light in the digital images. An oily skin gleams more, and this is translated as a higher percentage of light pixels in the image. A dry skin is matter and has zones that do not reflect well on the digital image.

These findings will not be used as an additional measure for the evaluation of the skin types for the time being, out of

practical considerations.

*

* *

Typology of the skin in practice

It is often important to be able to determine the skin type in a fast and simple manner so as to be able to give correct skin advice regarding the use of cosmetics, food supplements or even cosmetic and medical treatments.

The patient is placed in a comfortable position and one waits until his/her breathing has calmed down and he/she no longer perspires visibly. Then, the surplus cream or sebum on the face is absorbed with a soft paper tissue by exerting a light pressure without any rubbing.

Now the measurements can start.

Automatic position recognition of the 13 facial zones

In order to simplify the segmentation of the face in 13 zones, one can take a front view and side view digital image of the face (fig. 12a and 12b).

Possibly by means of a computer analysis (neural networks), or alternatively through the doing of a person, the face can be divided in 13 zones, based on the anatomical boundaries (nose, lips, eyes, eye brows, hairline, jaw line, ears, etc.). The segmentation of the face can then be represented on screen, printed as a photograph of the face or projected on the consumer's face by means of a light source, such that the measurement zone and location can be univocally established. The measurement instrument comprises the necessary sensors (in this case 5 sensors, being: 1. Hydration meter, 2. TEWL meter with built-in thermometer, S. Sebum meter or optical reader of the sebum strip, 4. Digital camera equipped with polarised and non-polarised oblique incident light, 5. Elastometer (as an option), which are all connected to a central processor provided with the necessary control switches and a screen, possibly a touch screen.

Each of the six skin parameters is measured in a different way. Every measurement is repeated until the obtained standard deviation for this measurement drops under a pre-determined maximum value. The findings are represented in a table.

SEBUM (0)

The sebum content is measured by pressing a sebum strip on zone 10 for 10 seconds and by then optically reading it. A second measurement is carried out with another sebum strip on zone 8b. The results of these two measurements are represented in microgram/cm^2. An image is recorded with non-polarised light in zone 1 and in zone 8b and the number of pores and their

size is evaluated.

HYDRATION (D)

The hydration meter is applied in zone 8b and in zone 13 and a measurement is carried out. The hydration is expressed in terms of % humidity. An image is recorded with non-polarised light in zone 8b and in zone 13. Both images are assessed on the orientation of the distribution rose (anisotropy index) and the other parameters of the microstructure (density, Ra, Rv, Rp, Rt, Sm).

SENSITIVITY (S)

The TEWL is measured in zone 8b and 13. The value is expressed in terms of gram per hour per m^2. An image is recorded with polarised light in zone 8b and zone 13 (zone 10 as an option).

This excludes any light reflection by the skin surface and provides an in-depth view in the skin tissues where the pigment and blood vessels are situated. These partly determine the colour of the skin.

In a subsequent phase, the colours can be pre-calibrated and defined in terms of colour codes. The blood vessels with their predominantly red colour are separated from the moles with their predominantly brown colour. As a result, the "red" aberration of the blood vessels becomes visible.

Both images (zone 8b and zone 13) are assessed on the redness and the dilated blood vessels. The redness is represented in

a colour scale, such as the Lab code or RGB code. The dilated blood vessels are represented in terms of % surface in relation to the total surface of the image.

PIGMENT SHIFTINGS (P)

An image of zone 13 is recorded with polarised light.

The blood vessels with their predominantly red colour are separated from the moles with their predominantly brown colour. This makes the "brown" aberration of the pigment visible as a non-homogeneous pigment distribution.

The more advanced the damage is, the more non-homogeneous the pigment distribution will be.

Absolute uniformity can be found in the pigment distribution of young children. The older the skin, the more damage there is and the more irregular the pigment distribution in dark zones where there is an excess of pigment, apart from zones having a normal pigmentation. As one ages further, there will even be a loss of pigment in certain zones, as a result of which spots that are lighter than the skin colour become visible.

In order to make it possible to make calculations in terms of figures and graphs, the images are translated in grey levels and the total surface is divided in areas of 12 pixels by 12 pixels. Within each of these smaller areas, there is a uniform average grey level that can be compared to the average grey level of the total surface before the

division was made.

A baby is born with a regular pigment distribution, which is reflected in an even complexion. Translated in grey levels, this results in an almost regular grey area whereby the majority of the areas (12 pixels by 12 pixels) are situated within one and the same grey level (figure 15).

In the graph, this is expressed in terms of a peak corresponding to a large number of pixels (number of pixels represented on the x-axis), situated within a narrow dispersion of the grey levels (grey levels represented on the y-axis) (figure 16).

As years go by, the complexion becomes irregular and dark spots appear due to an increase of the brown components (figure 17). This is initially translated in terms of two peaks of grey levels. Apart from the high peak of the lighter grey levels corresponding to the basic colour of the skin, there is also a second peak distributed over a zone of dark grey levels corresponding to the colour of the spots (figure 18).

In an even later stage of life, also lighter spots appear next to the dark spots, due to a loss of pigment (figure 19).

This is expressed in the graph as an even lower peak for the background colour whose surface decreases and which thus also decreases in terms of the number of pixels (x-axis) (magnitude of the background colour also decreases), whereas the number of pixels in the dark grey levels increases. The

new peak in the lighter grey levels to the right of the background colour represents lighter pixels from zones that have lost their pigment (figure 20).

Statistically, these graphs can be further processed to show the homogeneity in grey levels of the young skin in comparison to the non-homogeneity of the older, damaged skin. To that end, the average grey level of the entire surface is calculated first with the standard deviation as a measure for the dispersion.

This already gives an indication of age. An older skin on average has a darker grey level (due to the spots) and a larger standard deviation in comparison to a baby skin.

In a second phase, the average grey levels can be plotted out in a graph on the y-axis as opposed to the number of pixels on the x-axis. Also the median (M or 50^{th} percentile) and other percentile lines (e.g. 5^{th} -10^{th} - 15^{th} - 20^{th} - 25^{th} - 30^{th} - 35^{th} - 40^{th} and 45^{th} percentile) can be represented on the y-axis.

A representation of the dispersion by means of a conventional box plot with the smallest grey level, the first quartile, the median, the third quartile and the largest grey level as five points will not suffice to assess a population on its homogeneity.

Homogeneity is defined here as the value that is inversely proportionate to the distance between the grey levels within which 80% of the pixels is situated (i.e. between the 10^{th} percentile and the 90^{th} percentile).

The larger the distance between the 10^{th} and the 90^{th} percentile on the scale of the grey levels (y-axis), the more irregular the distribution will be.

The homogeneity index, as represented here, is one over this distance in grey levels, within which 80% of the values are situated.

Homogeneity index = 1/ difference in grey level (GL) between the GL on the 10^{th} percentile and the GL on the 90^{th} percentile. The larger the distance between these two percentiles, the less homogeneous the structure will be.

The homogeneity index of the pigment distribution provides the value for the pigment shifting. It is also a measure for skin ageing.

Also shift and non-homogeneity in the "red colour" is a measure for ageing and is established in the same manner.

The latest software developments are based on what are called "neural networks" or artificial intelligence. They can "recognize" images and patterns so to say and also assign a value to it without carrying out all the aforesaid measurements. In this context, the calculations that are represented here should be regarded as one of the possibilities for quantifying the described patterns in an image. Every other method for quantifying the homogeneity versus the non-homogeneity, including the "neural networks", is possible as well.

The homogeneity index provides an image of the pigment shifting in zones without any perceptible moles. If the face has visible pigment shiftings in the form of any of the following three aberrations:

1. visible moles (type lentigo solaris),
2. melasma (or pregnancy mask) or
3. dark pigment discoloration round the eyes (often ethnically determined),

additional measurements will be carried out to establish a further image of the pigment shifting.

Measurement of visible moles: measure the difference in colour between the skin colour of the mole (zones 10, 11, 12, 8, 13 or 7) and the general skin colour (see parameter F) .

Measurement of the melasma: measure the difference in colour between the skin colour of the melasma (zones 1, 10, 11,8, 12, 7, 13 or 3) and the general skin colour (see parameter F).

Measurement of the dark pigment discoloration round the eyes, also called circles: measure the difference in colour between the skin colour of the circles (zone 9) and the general skin colour (see parameter F).

MICROSTRUCTURE (W)

An image of zone 13 is recorded with non-polarised light.

During research on the facial skin of young and old persons,

the researchers looked for aberrations in the skin's microstructure related to ageing, and for new assessment methods of the microstructure as a quantitative proof. Only the aberrations in the microstructure of a skin surface in zones without any visible wrinkles are concerned.

Most striking is the discovery of a much more uniform or homogeneous pattern in the distribution of the skin grooves in a young skin, compared to that of an older person. This observation is a constant. All babies have a uniform distribution of the skin grooves, whereas all elderly persons have an irregular pattern of the skin grooves. Over the years, a shift is observed from a uniform, homogeneous structure to an non-homogeneous, chaotic structure. Thus, the older facial skin is not necessarily characterised by more or less grooves per unit area of skin (density), by a larger or smaller average distance between the lines of the network (Sm), by deeper or more superficial grooves (Ra and Rt), or by an isotropic or anisotropic orientation of the grooves.

Anisotropy is observed in babies as well as in the age group of sixty-year-old persons.

Isotropy is observed in all age groups as well, including elderly people.

Thus, the applicable values that have been described up to now are no liable measure for facial skin ageing in individuals. Moreover, a simple treatment such as applying a conventional hydrating cream to the face may alter the data

considerably.

Rather, it is the irregular distribution of the grooves and of their grey levels that is a reliable indication of skin ageing, all the more as the skin has been exposed to more damage.

The most striking visible anomaly is observed in the network of the skin grooves. A baby has a very regular network with an almost uniform distribution of the network over the facial skin (figure 21). As a person gets older, the distribution of said network becomes irregular, and zones with a denser network structure alternate with zones that have no network structure at all (figure 22). The average density and Sm of the network may be equal for baby's and elderly persons, although the homogeneous distribution differs considerably.

In order to represent this evolution of the distribution in figures, the network was isolated from the background and the size of every black pixel was enlarged by a fixed value. As a result, the contrast between both networks is even larger. The small openings in the network tend to converge, and the contrast with the larger openings in the network grow obvious. The young skin has a uniform distribution (figure 23) as opposed to the older skin (figure 24).

The entire surface is now divided in smaller areas of 12 by 12 pixels. Within each of these smaller areas there is a uniform average grey level that can be compared to the average grey level of the total surface before the

segmentation. The uniformity of the young skin (figure 25) is still more clearly visible here than the irregularity of the older skin (figure 26). The grey levels were plotted out on the y-axis in a graph as opposed to their number of pixels on the x-axis. The young skin has an accumulation of pixels round the average grey level (figure 27), which is an indication of homogeneity. However, the older skin has a larger dispersion of the grey levels with many pixels situated far away from the average (figure 28), which is an indication of non-homogeneity.

Statistically, these graphs can be further processed to check the homogeneity in grey levels of the young skin to the non-homogeneity of the older skin. To that end, the average grey level of the entire surface is calculated first, and the standard deviation is taken as a measure for the dispersion.

This already gives an indication about the age. An older skin sometimes has a lighter average grey level (due to the numerous holes in the network), but especially a much larger standard deviation in comparison to a baby skin.

In a second phase, the average grey levels can be plotted on the y-axis in a graph as opposed to the number of pixels on the x-axis. Also the median (M or 50^{th} percentile) and other percentile lines (e.g. 5^{th} - 10^{th} - 15^{th} - 20^{th} - 25^{th} - 30^{th} - 35^{th} - 40^{th} and 45^{th} percentile) can be represented on the y-axis.

A representation of the dispersion by means of a conventional box plot with the smallest grey level, the first quartile, the median, the third quartile and the largest grey level

as five points will not suffice to assess a population on its homogeneity.

Homogeneity is defined here as the value that is inversely proportionate to the distance between the grey levels within which 80% of the pixels is situated (i.e. between the 10^{th} percentile and the 90^{th} percentile). The larger the distance between the 10^{th} and the 90^{th} percentile on the scale of the grey levels (y-axis), the more irregular the distribution will be.

The homogeneity index, as represented here, is one over this distance in grey levels, within which 80% of the values are situated.

Homogeneity index = 1/ difference in grey level (GL) between the GL on the 10^{th} percentile and the GL on the 90^{th} percentile. The larger the distance between these two percentiles, the less homogeneous the structure will be.

In principle, any image can be subdivided in smaller areas. The selected parameter (Ra, Rt, Sm or any other parameters) can be measured in the larger area and in each of the smaller areas. The dispersion of the averages, measured in the smaller areas, can be plotted on the y-axis and their number of the x-axis. A graph statistically still shows the best general image of the distribution. The homogeneity index can be determined as an additional figure.

The homogeneity index of the network provides the value for the skin ageing.

The latest software developments are based on what are called "neural networks" or artificial intelligence. They can "recognize" images and patterns as if it were, and also assign a value to them without having to carry out all the aforesaid measurements. In this context, the calculations demonstrated here should also be seen as one of the possibilities for quantifying the described patterns in an image. Every other method for quantifying the homogeneity versus the non-homogeneity, including the "neural networks", is possible as well.

Once wrinkles are visible in the skin, they can be quantified via other operations. Length, width, depth and number of wrinkles can be established in figures as aberrations in a background of the microstructure. Various computer programs as well as "neural networks" can be used to this end.

Three types of wrinkles will be described here and classified on the basis of their origin:

Expression wrinkles are the result of muscle contractions. Here, the small wrinkles next to the eyes (between zone 9 and zone 11) are taken as an example in a relaxed condition of the orbicular muscles around the eyes (not while laughing).

The stretchable wrinkles originate from a lack of volume and slackening of the skin. In this case, the wrinkles in the cheek in zone 7 are taken as an example in a relaxed condition of the cheek muscle.

The non-stretchable wrinkles originate from a groove in the

skin structure. Here, the wrinkles in zone 5 are taken as an example in a relaxed condition of the mouth muscles.

These wrinkles can also get a quote via computer analysis on the basis of their disruption of the background's microstructure in comparison to the more homogeneous, non-wrinkled skin structure.

SKIN COLOUR (F)

The skin colour is best measured on a part of the face that is not exposed to the sun. Since the face is usually exposed to sunlight, the transition between the neck and jaw line, where the neck is all but just overshadowed by the jaw line, is the most appropriate place for a skin colour measurement (right under the boundary between zone 7 and zone 13). The colour rendering is expressed in terms of a colour code, such as the Lab scale or RGB scale.

A Fitzpatrick classification of the phototype may provide additional information about the skin colour and is represented in Roman figures from I to VI. Albino's are left aside for the moment, given the rare character of this disorder.

Consequently, every skin measurement corresponds to one value and one unit. A skin type can be represented in figures as follows:

SEBUM (O)

Sebutape zone 10

Sebutape zone 8b

Digital image pores zone 1

Digital image pores zone 8b

HYDRATION (D)

Hydration value zone 13

Hydration value zone 8b

Distribution rose zone 13

Distribution rose zone 8b

SENSITIVITY (S)

TEWL zone 8b

TEWL zone 13

Digital image redness zone 8b

Digital image redness zone 13

PIGMENT ABERRATION (P)

Homogeneity index for pigment zone 13

Colour of the largest mole

Colour of melasma spot (pregnancy mask)

Colour of discoloration around the eyes(zone 9)

MICROSTRUCTURE (W)

Homogeneity index for the network zone 13

Wrinkles in boundary zone 9 and zone 11 (small wrinkles)

Wrinkles in zone 7

Wrinkles in zone 5

SKIN COLOUR (F)

Colour code in Lab or RGB under boundary zone 7 and zone 13

Fitzpatrick phototype

For men, zone 13 corresponds to the hairy area of the face. A beard as well as regular shaving of the beard may influence the measurements. That is why all measurements of zone 13 are replaced by the same measurements in zone 11 for men.

The reflection of the sensitivity and dilated blood vessels is the largest in zone 8b. For some patients, however, the reflection is the largest in zone 12. This is visible there as redness. In case of doubt, both zones or the boundary region between both zones can be measured.

Although every measurement has an absolute value, it is not wise to use it for the code that has to render the skin type, unless for medical and experimental goals. A system whereby certain limits and subdivisions are defined beforehand works well. The limits and subdivisions are determined on the basis of the standard within the population concerned.

All these values are checked in relation to a reference population, and arbitrary limits are established. Above and under these limits, we speak of high and low values respectively.

The parameters that characterise the skin can be converted or translated in a code.

Indeed, in order to make this system usable for a quick skin characterization it needs to be simplified; said simplification must render the skin type concerned well, however.

For the sake of convenience, each of the first five parameters (O,D,S,P,W) gets an arbitrary figure that is directly proportional to the result of the measurement. How this figure is established, depends on what goal it is to serve.

A simple model for cosmetic advice has been developed here. Variants for other goals are possible.

A value above the preset limit gets 1 point. A value under the preset limit gets 0 points.

SEBUM (O)	
Sebutape zone 10	0 or 1
Sebutape zone 8b	0 or 1
Digital image pores zone 1	0 or 1
Digital image pores zone 8b	0 or 1
HYDRATION (D)	
Hydration value zone 13	0 or 1
Hydration value zone 8b	0 or 1
Distribution rose zone 13	0 or 1
Distribution rose zone 8b	0 or 1
SENSITIVITY (S)	
TEWL zone 8b	0 or 1
TEWL zone 13	0 or 1
Digital image redness zone 8b	0 or 1
Digital image redness zone 13	0 or 1
PIGMENT ABERRATION (P)	
Homogeneity index for pigment zone 13	0 or 1

Largest visible brown spot/normal skin	0 or 1
Melasma (pigment mask) /normal skin	0 or 1
Pigment around eye zone 9/normal skin	0 or 1

MICROSTRUCTURE (W)

Homogeneity index for the network	0 or 1
Wrinkles side eye zone 9-11	0 or 1
Wrinkles in zone 7	0 or 1
Wrinkles under lip zone 5	0 or 1

SKIN COLOUR (F)

Colour code under boundary zone 7 and zone 13

1 to 6

in Lab or RGB, subdivided in 6 levels, from the lightest skin colour to the darkest skin colour.

Fitzpatrick type	1 to 6

Both figures are added and divided by two.

Ex. 1. colour code 3 and Fitzpatrick 3 = 6 divided by 2 = 3

Ex. 2. colour code 3 and Fitzpatrick 2 = 5 divided by 2 = 2.5

A figure 4 for the parameters O, D, S, P and W means the highest level.

A figure 0 for the parameters O, D, S, P and W means the lowest level.

A figure 1 for parameter F means the lightest skin type.

A figure 6 for parameter F means the darkest skin type.

A second variant to this classification can be calculated as follows:

A value above the predetermined upper limit gets 1 point.

A value under the predetermined lower limit gets 0 points.

A value between the two limits gets 0.5 points.

A third variant to this classification can be calculated as follows on parameters whereby a ratio applies, such as for the following parameters: SEBUM, HYDRATION, SENSITIVITY:

0 points: lowest and highest value low, ratio situated between 0.7 and 1

1 point: lowest value low, highest normal, ratio < 0.7

2 points: lowest and highest value normal, ratio between 0.7 and 1

3 points: lowest value normal, highest high, ratio < 0.7

4 points: lowest and highest value high, ratio between 0.7 and 1

Given the fact that, apart from the physical/chemical

measurement, there is also a visual measurement for some parameters, the points are assigned twice as a whole.
8 points is the highest score, 0 points the lowest score, 4 points the normal score. A division by 2 brings the number of points to the level of the first method, i.e. from 0 to 4.

The other 2 parameters (P and W) retain their score from 0 to 4.

The final parameter (F) retains its score from 0 to 6.

The selected methodology is instructed to the computer which can make the calculation and the comparison itself via for example "Neural networks". The accepted ratio limits (here set to 0.7) are predetermined on the basis of reference values of the population concerned.

The present invention is by no means restricted to the method described above and represented in the accompanying drawings. Thus, especially as far as the further processing of the image material is concerned, many variants can be applied that are based on the core of the present invention and consequently still remain within the scope of the method according to the invention.

Claims

1. Method to determine a person's facial skin type in a standard manner, characterised in that the skin types are represented in figures by taking into account a selection of measurable parameters.

2. Method according to claim 1, characterised in that the measurements are carried out in specific zones of the face, taking into account the parameter's rendering in that zone.

3. Method according to claim 1, characterised in that physical/chemical as well as visual measurements are carried out for one and the same parameter.

4. Method according to claim 1, characterised in that the results are interpreted by comparing the measured values in different places.

5. Method according to claim 1, characterised in that the results are interpreted by determining the correlations between measured values in different places.

6. Method according to claim 1, characterised in that the results are interpreted by calculating the homogeneity index for pigment and/or microstructure as a measure for skin ageing.

7. Method according to claim 1, characterised in that it comprises the development of a code system that simplifies the interpretation of the skin type and minimizes the risk of any erroneous interpretation by taking several aspects of every parameter into account.

8. Method according to claim 1, characterised in that the method comprises the steps of determining one or several of the parameters, such as sebum content, hydration level, sensitivity, possible presence and concentration of moles and of aberrations in the skin structure and skin colour, whereby the above-mentioned parameters should be measured in specific areas of the face, and whereby, in order to measure each of the above-mentioned parameters, a standardised measuring method is used, such that the result of every measurement can be translated in a figure or code, as a result of which the different measured results can be translated into a global result in a standardised manner which corresponds to a skin typology for which a specific treatment is appropriate.

9. Method to determine the facial skin ageing, characterised in that it mainly consists in determining the homogeneity of distribution of a parameter of the skin surface or skin tissue of at least a part of a person's face, whereby the homogeneity is taken as a measure for skin ageing, and whereby the homogeneity decreases as the skin ages more.

10. Method according to claim 9, characterised in that skin grooves in the facial skin surface form the above-mentioned

parameter.

11. Method according to claim 10, characterised in that in order to determine the homogeneity of distribution of the skin grooves in the skin surface, an image recording of the skin surface of at least a part of the face is made.

12. Method according to claim 11, characterised in that the image recording is made with an oblique exposure.

13. Method according to claim 11, characterised in that an image in grey levels is obtained by means of the image recording, with lighter and darker zones corresponding to the relief of the skin surface.

14. Method according to claim 9, characterised in that pigments or blood vessels in the facial skin tissue form the above-mentioned parameter.

15. Method according to claim 14, characterised in that in order to determine the homogeneity of distribution of the pigment and/or blood vessels in the skin tissue, an image recording of the skin tissue is made for at least a part of the face.

16. Method according to claim 15, characterised in that the image recording is made by means of polarised light or any other form of exposure or sensor that can make an image recording of the blood vessels and/or pigment.

17. Method according to claim 15, characterised in that an image in grey values is obtained by means of the image recording, with lighter and darker zones corresponding to the position and quantity of pigment and/or blood vessels in the skin tissue.

18. Method according to any of claims 13 or 17, characterised in that the image in grey levels is divided in different areas to each of which is accorded a grey level that is equal to the average grey level in that area, and in that the present grey levels of the areas are plotted as a function of their appearance in the image so as to determine the dispersion of the grey levels, which dispersion is correlated to the homogeneity of distribution of the parameter concerned of the facial skin.

19. Method according to any one of claims 11 to 13 and 15 to 18, characterised in that the part of the face where the image is being recorded is the temple area (11) or the lateral jaw (13).

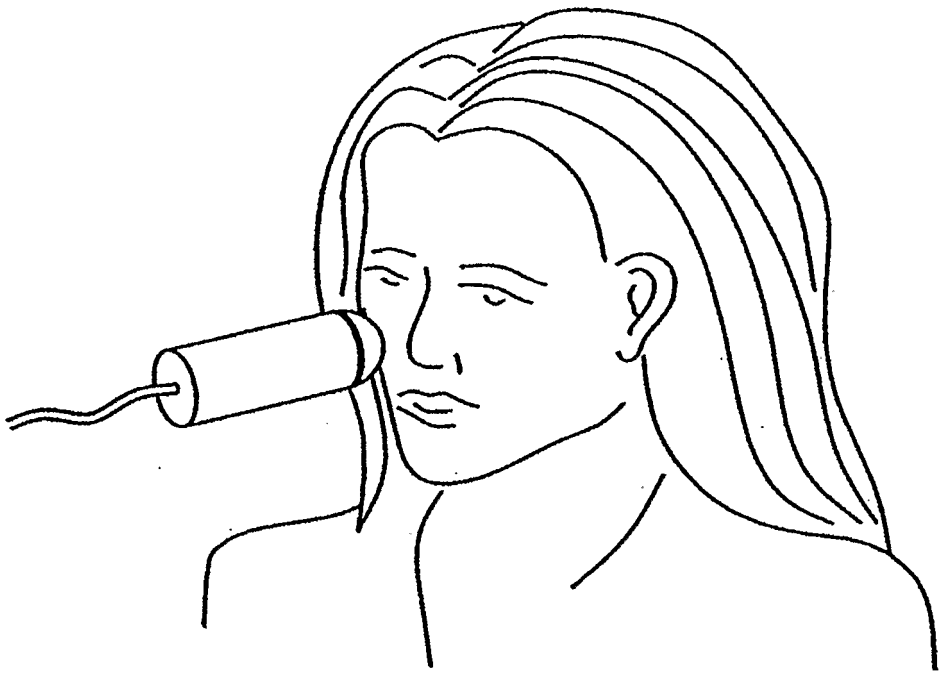


Fig. 1

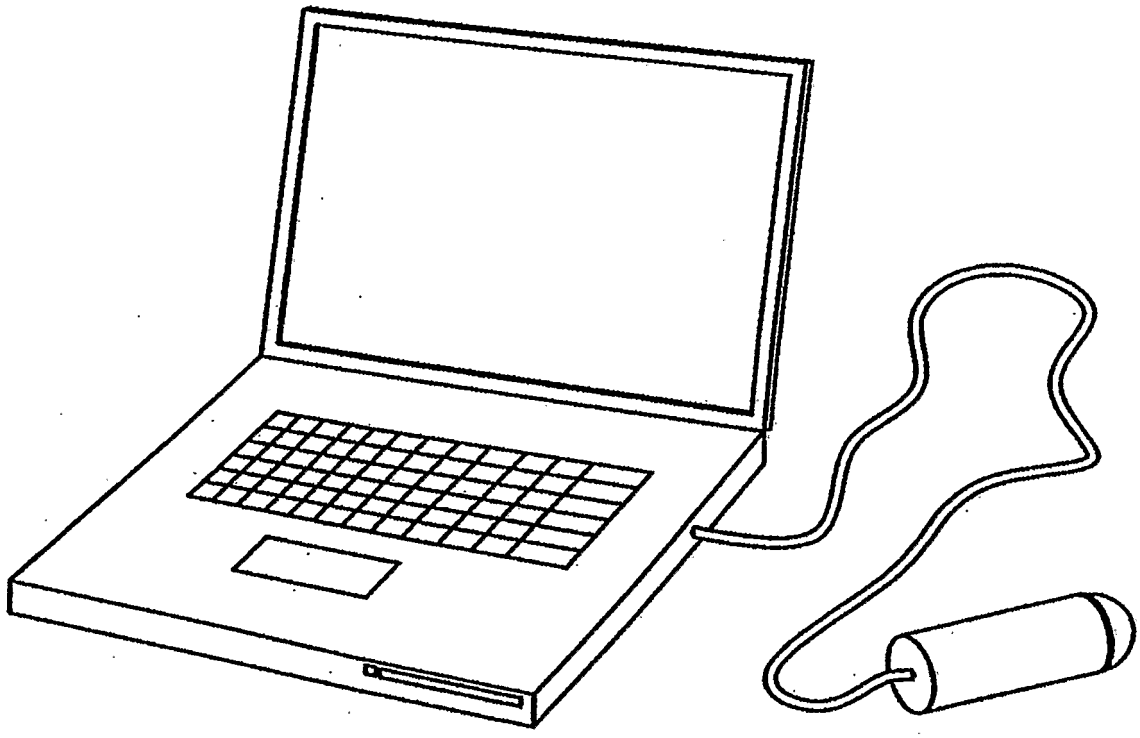


Fig. 2

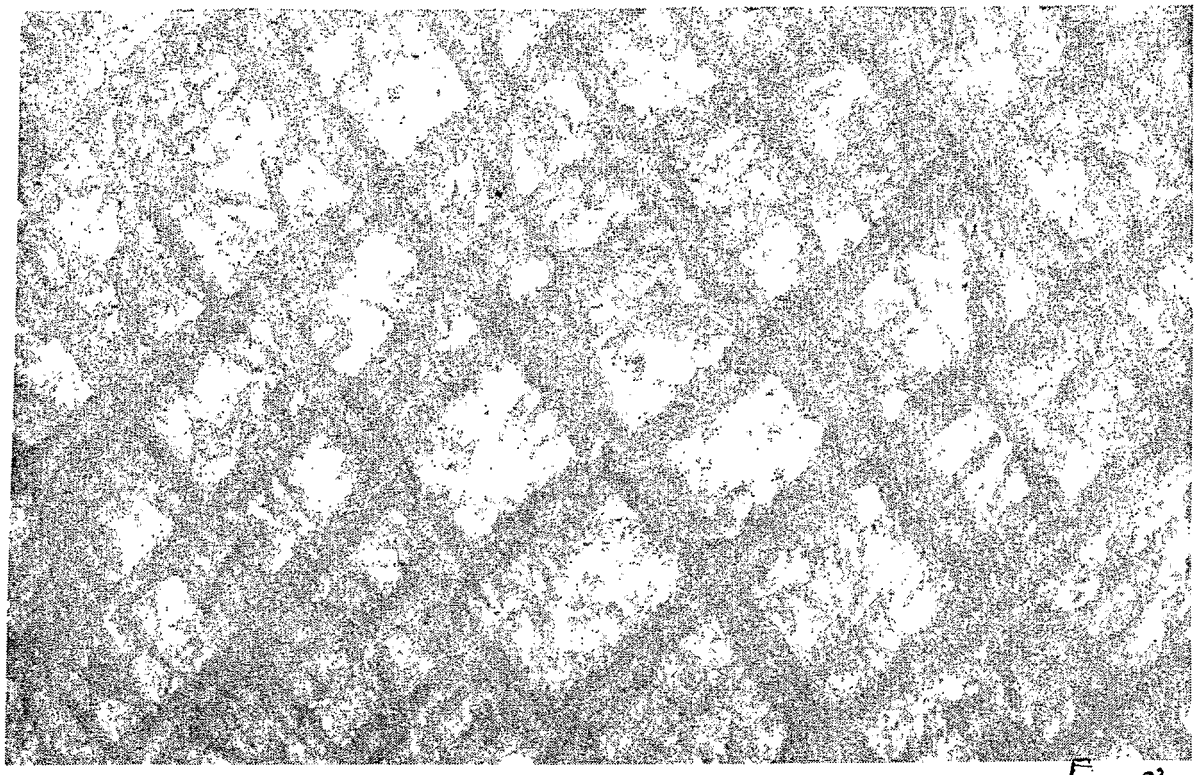


Fig 03

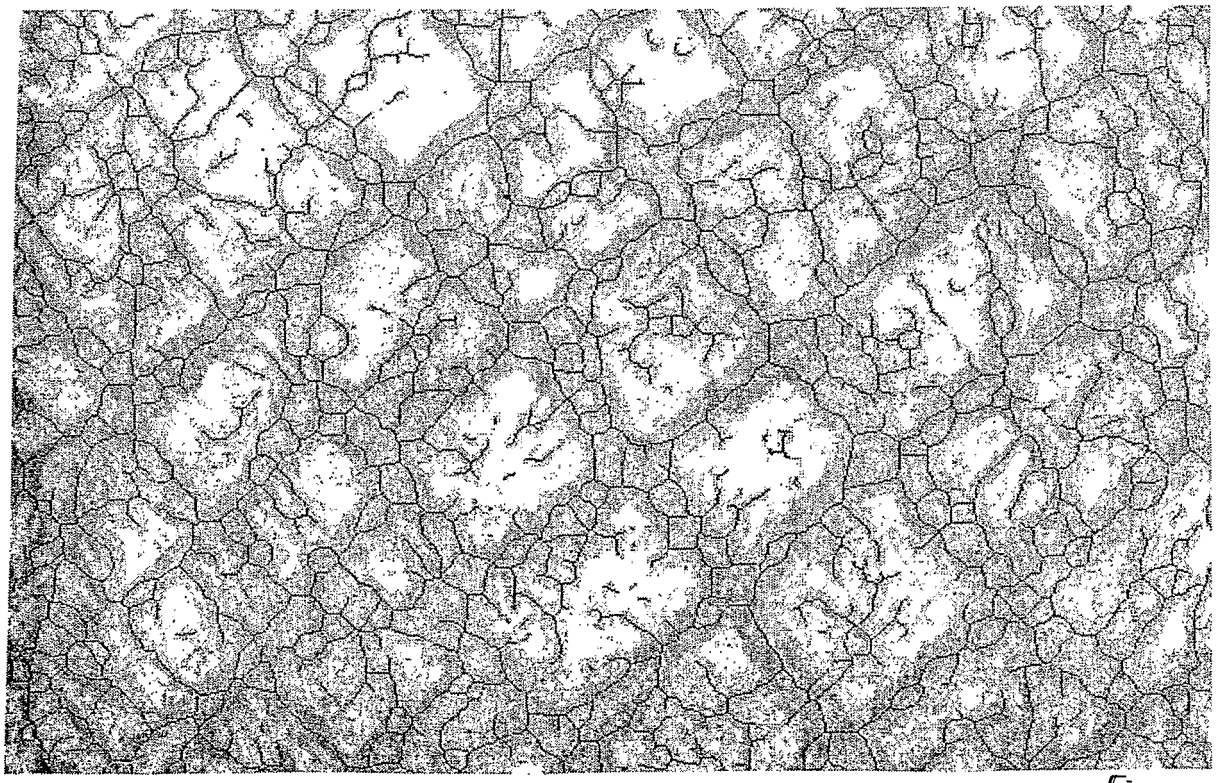


Fig 04

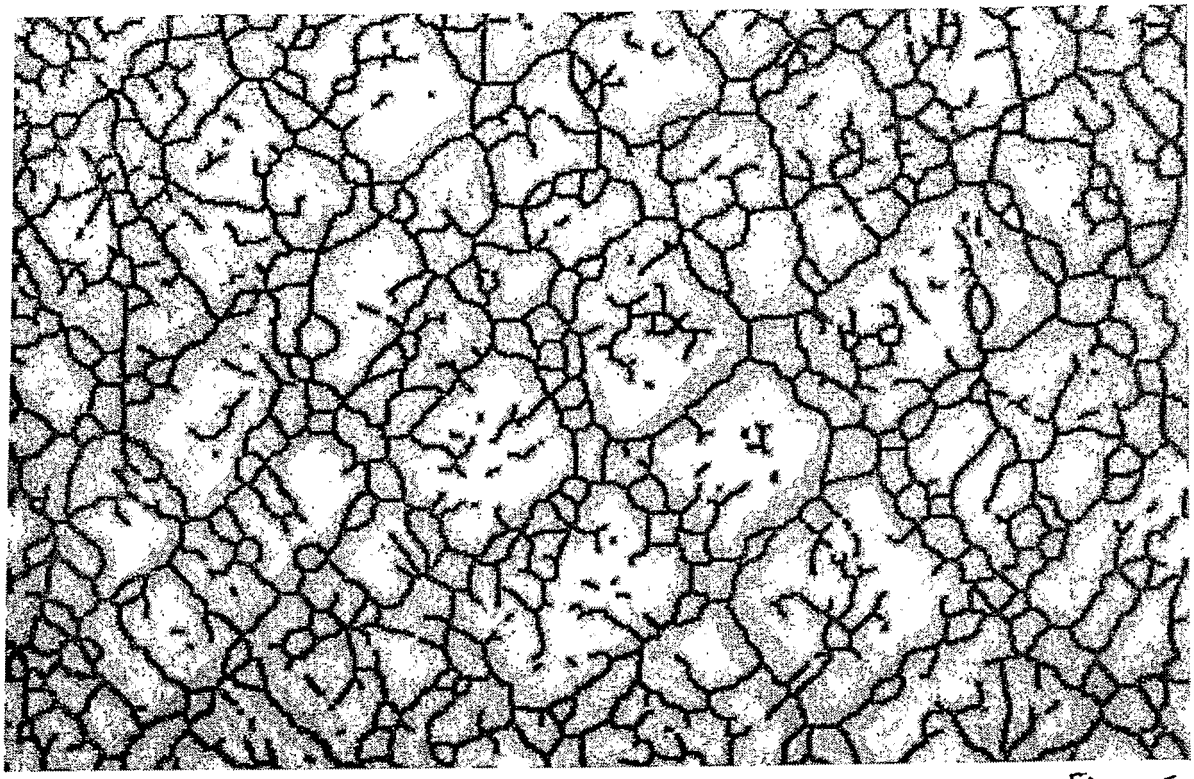


Fig 05

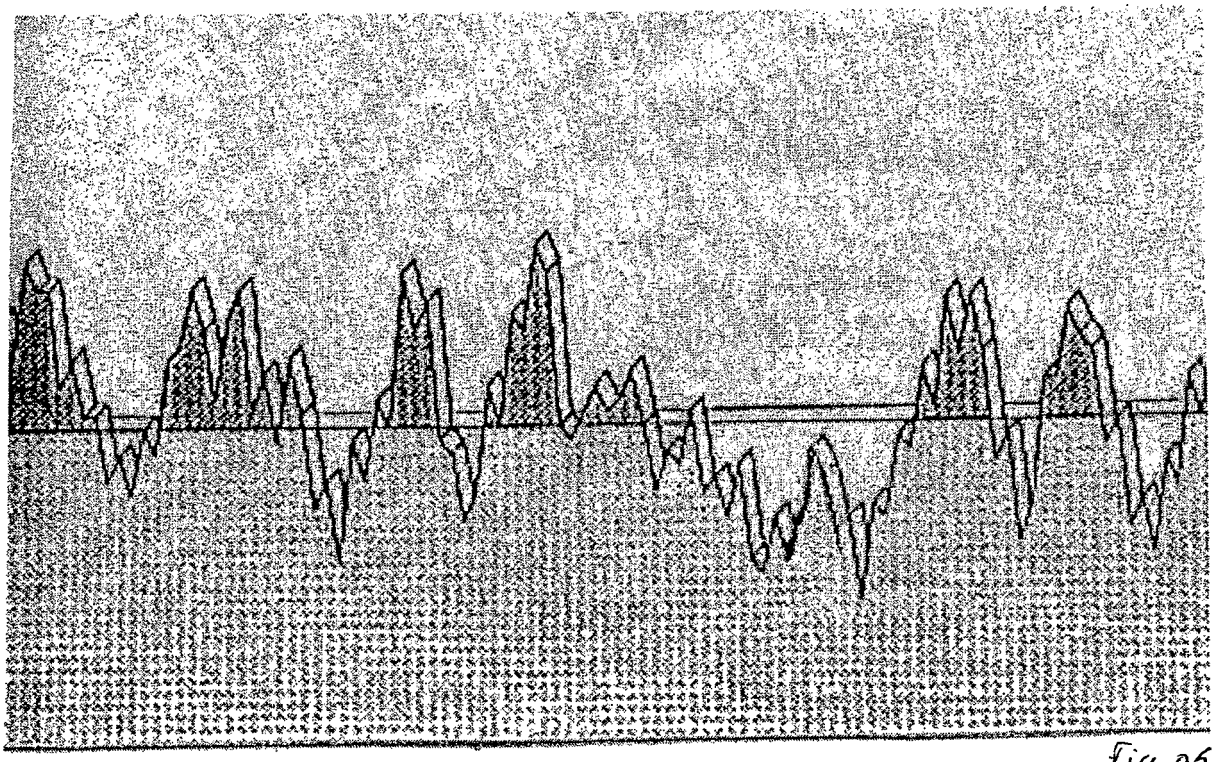


Fig 06

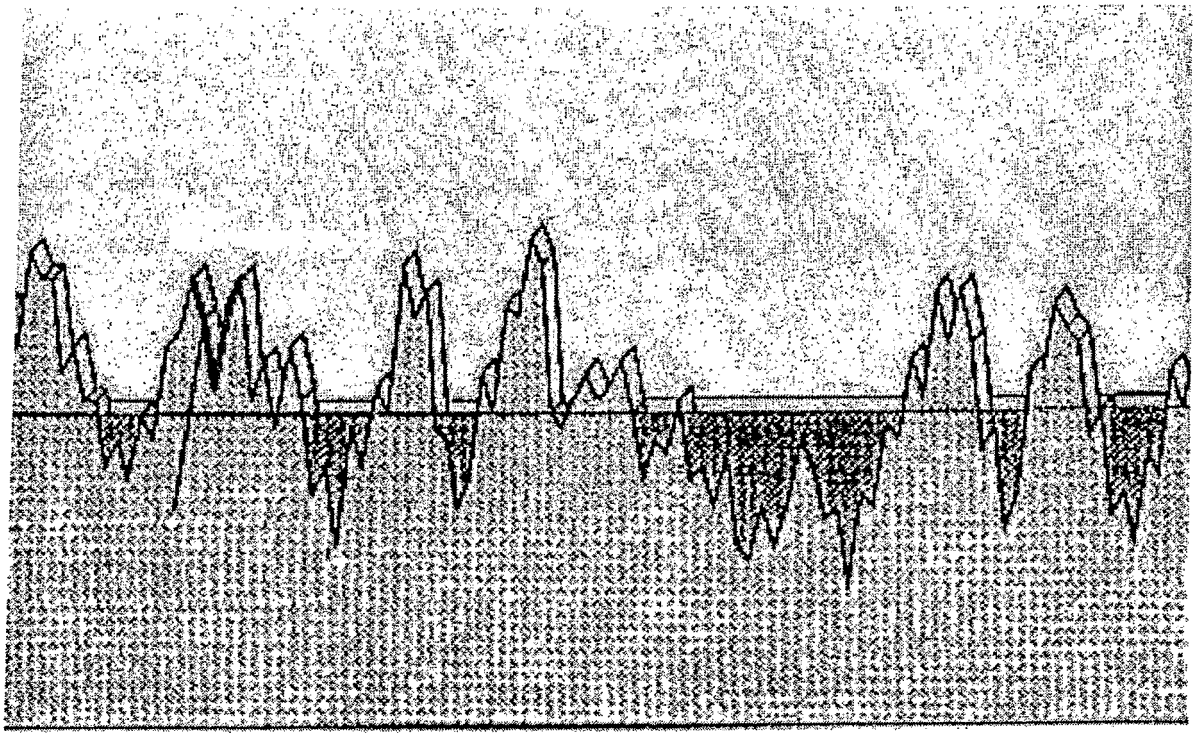


Fig 07

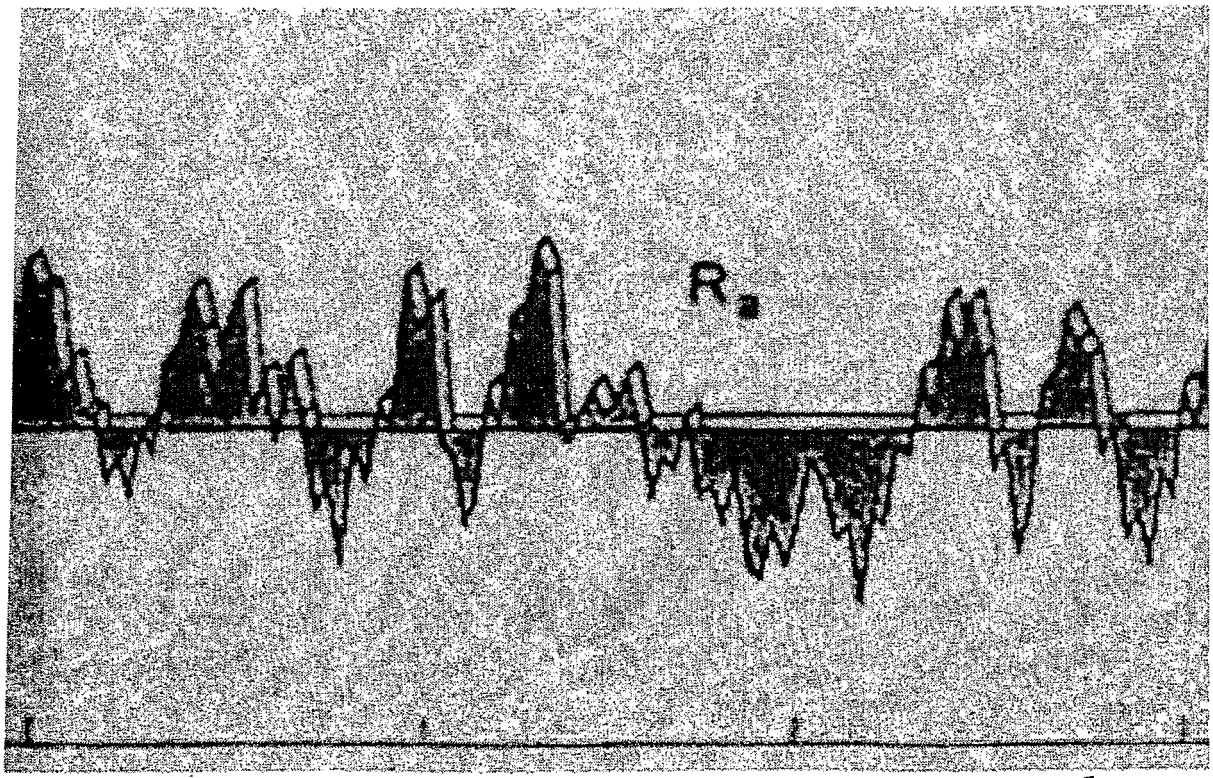


Fig 08

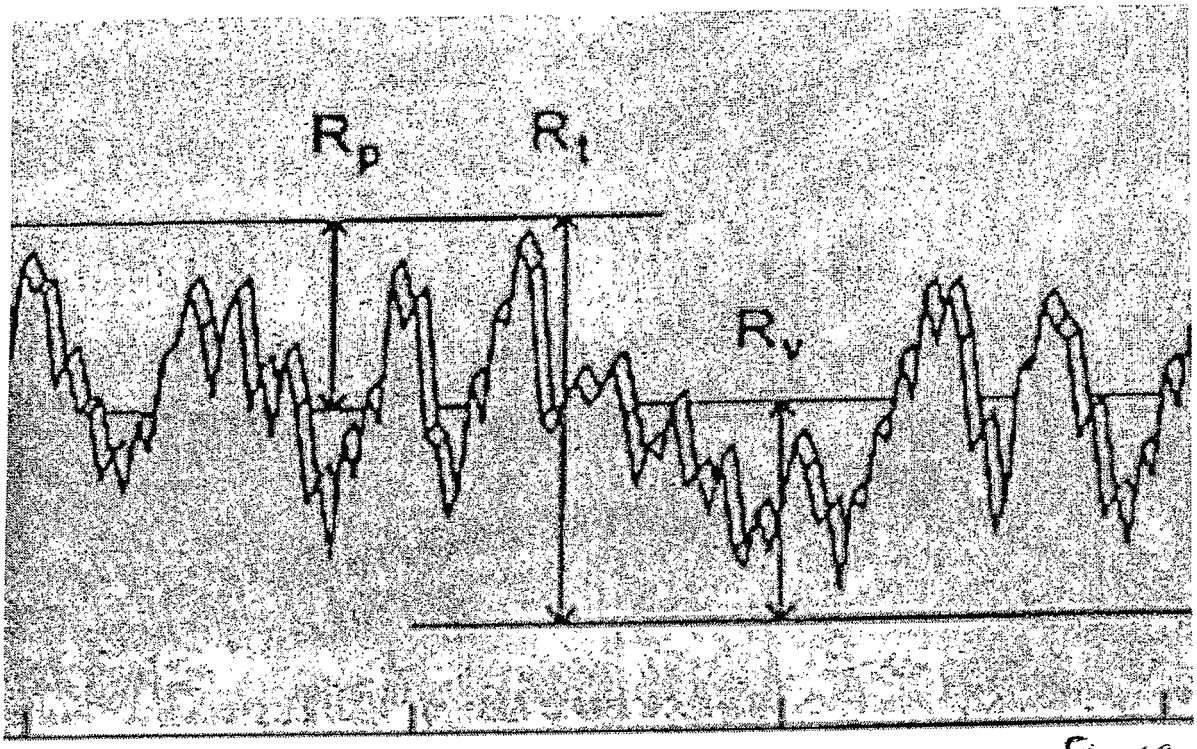


Fig 09

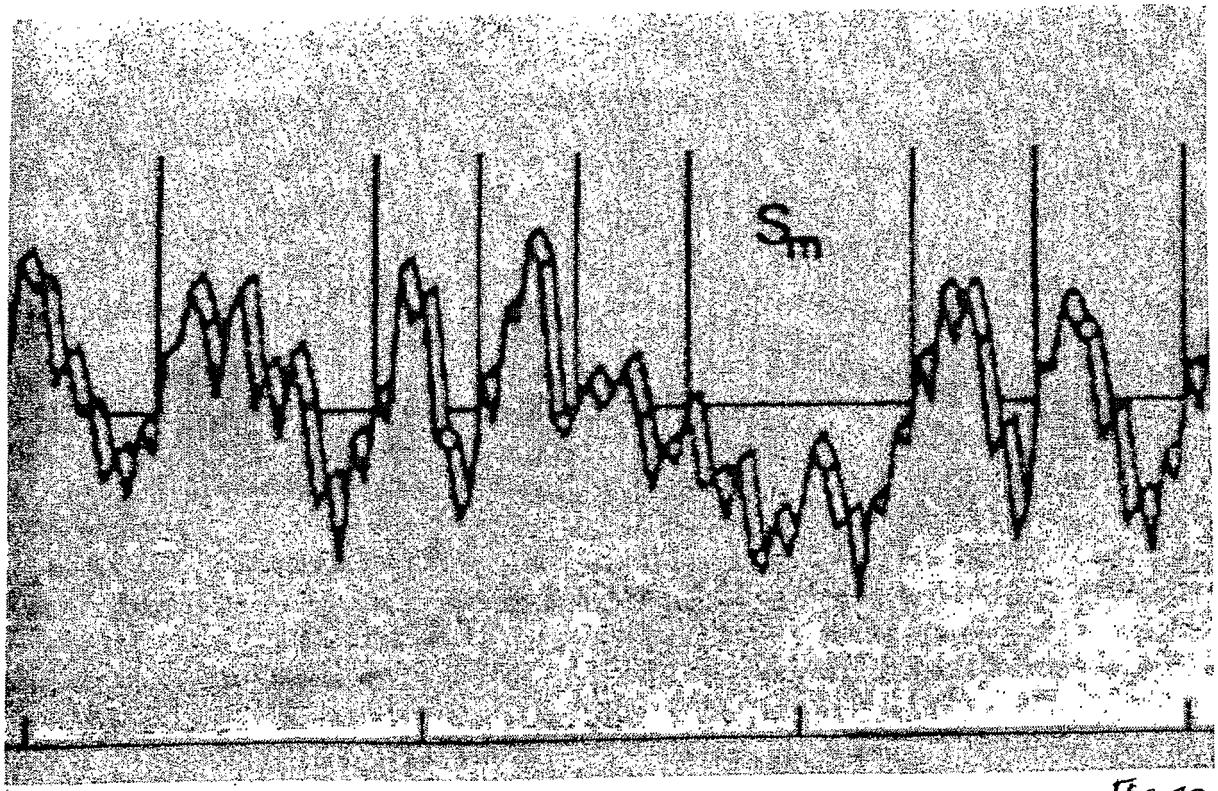


Fig 10

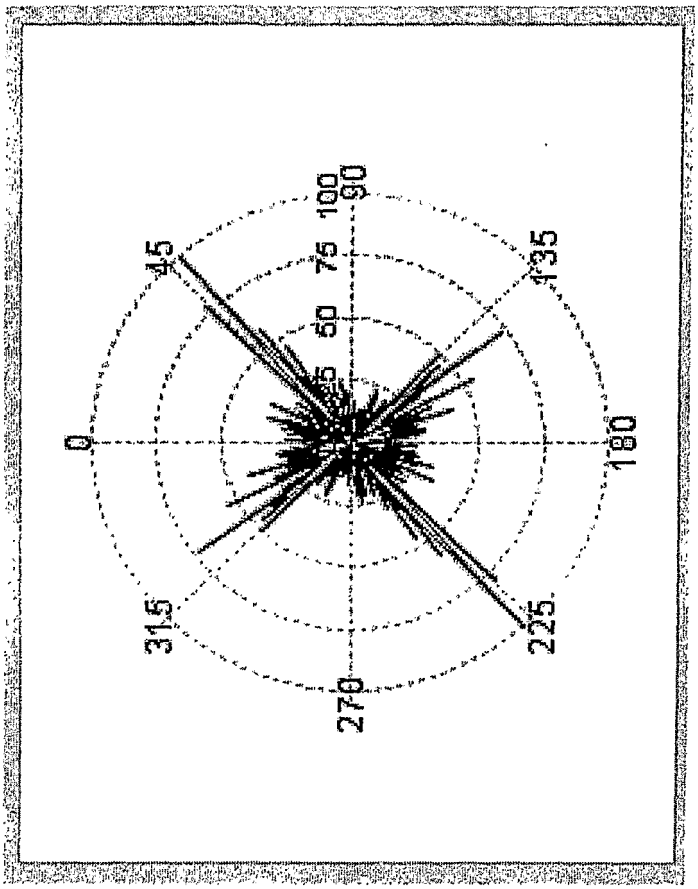
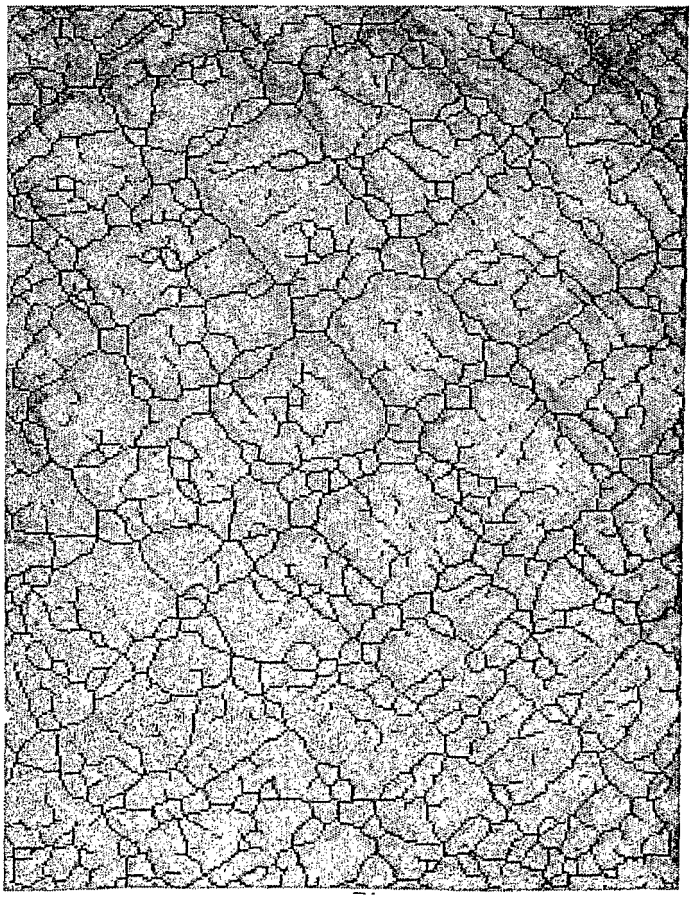


Fig 11



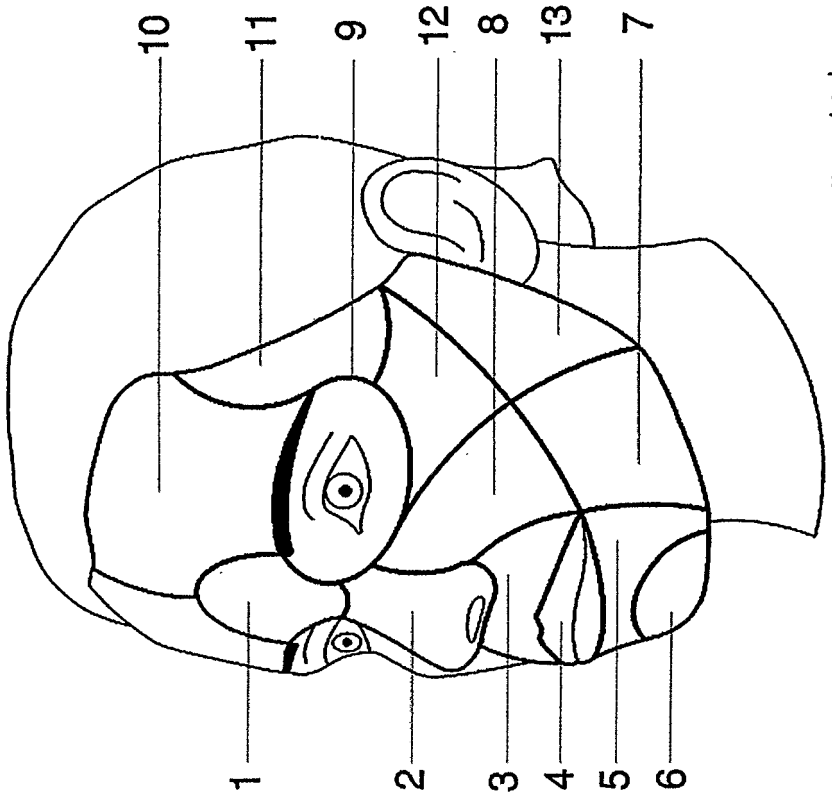


Fig 12b

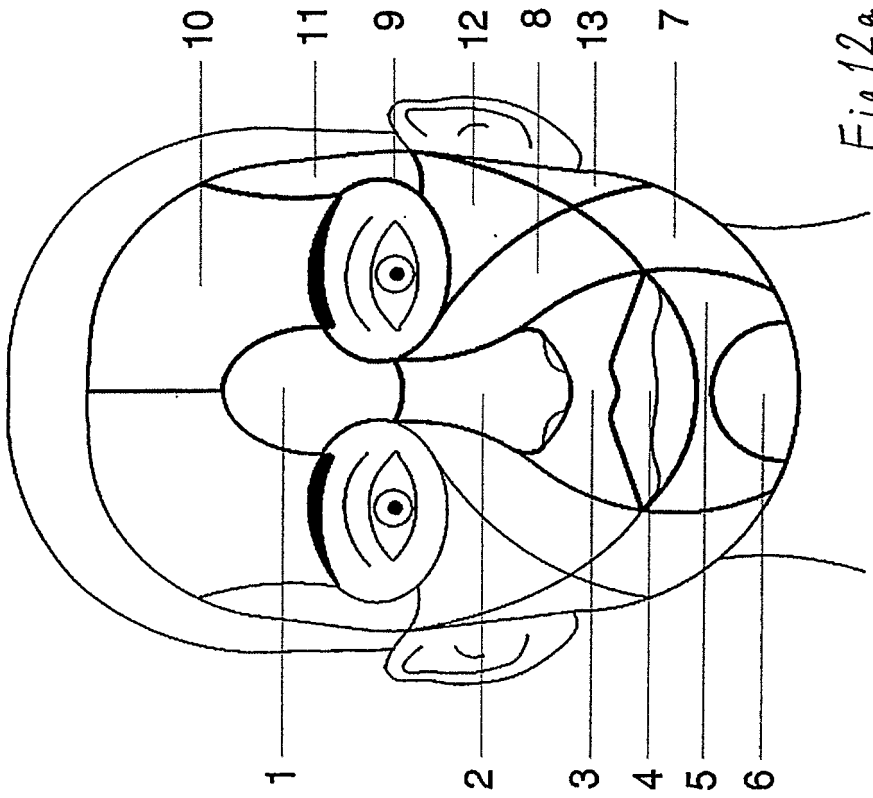


Fig 12a

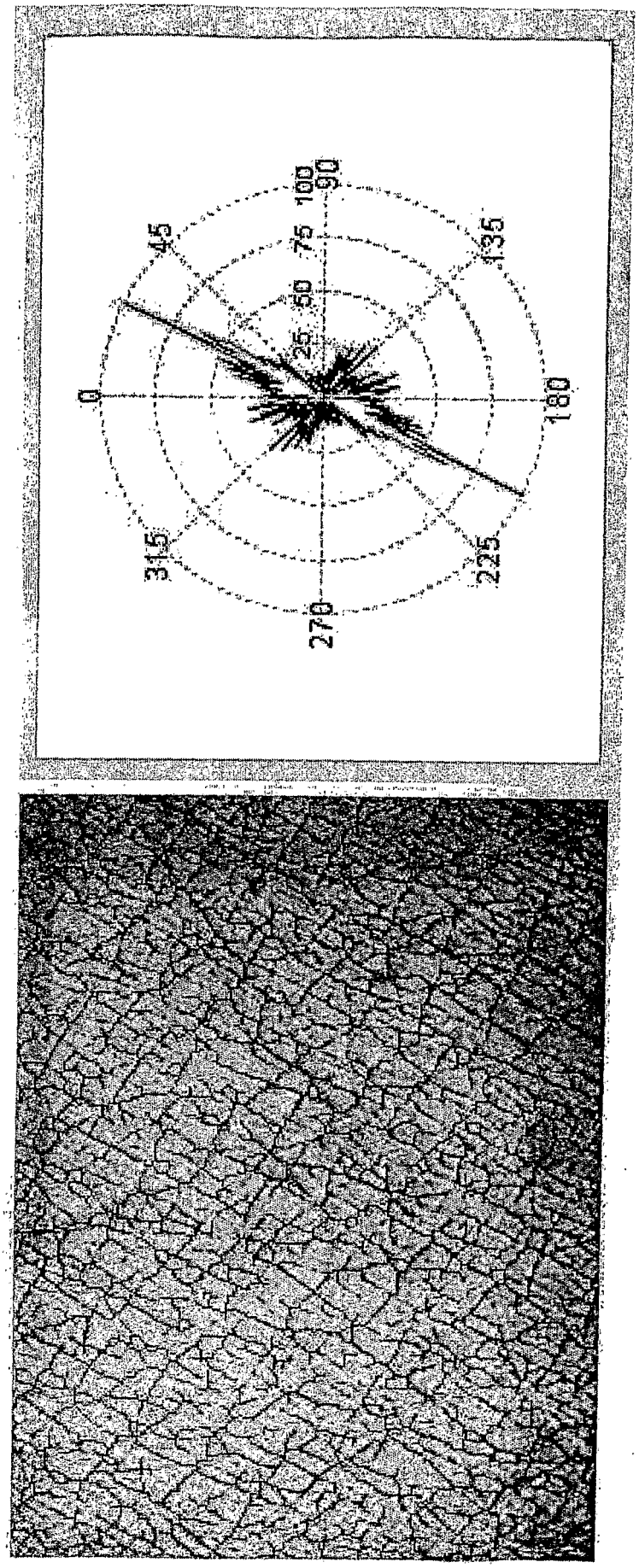


Fig 13

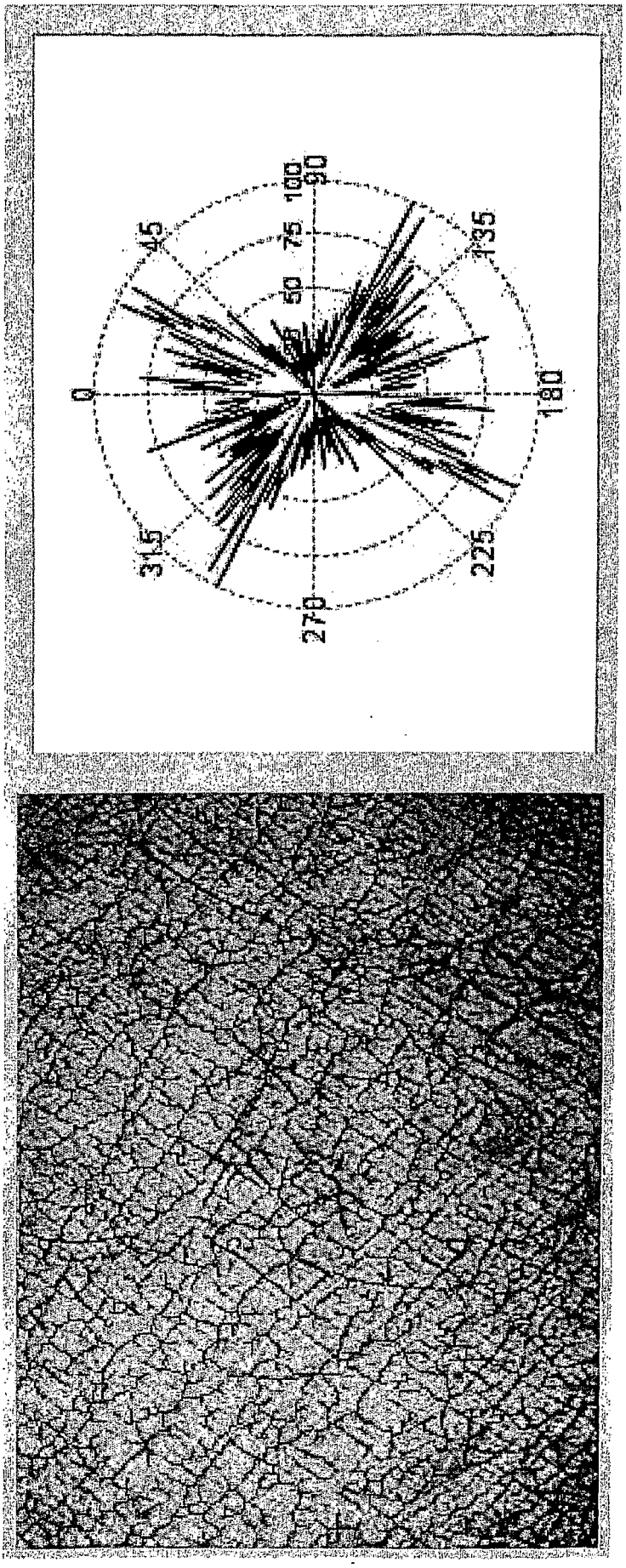


Fig 14



Fig 15

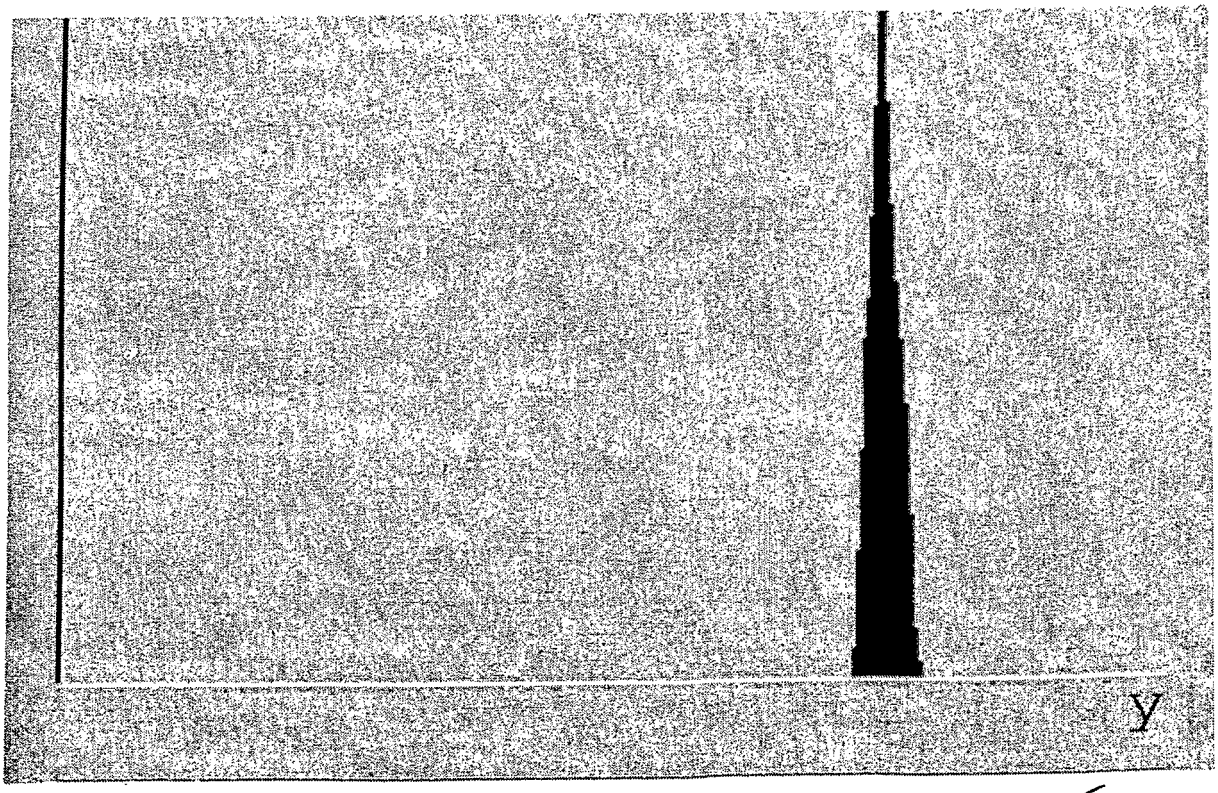


Fig 16



Fig 17

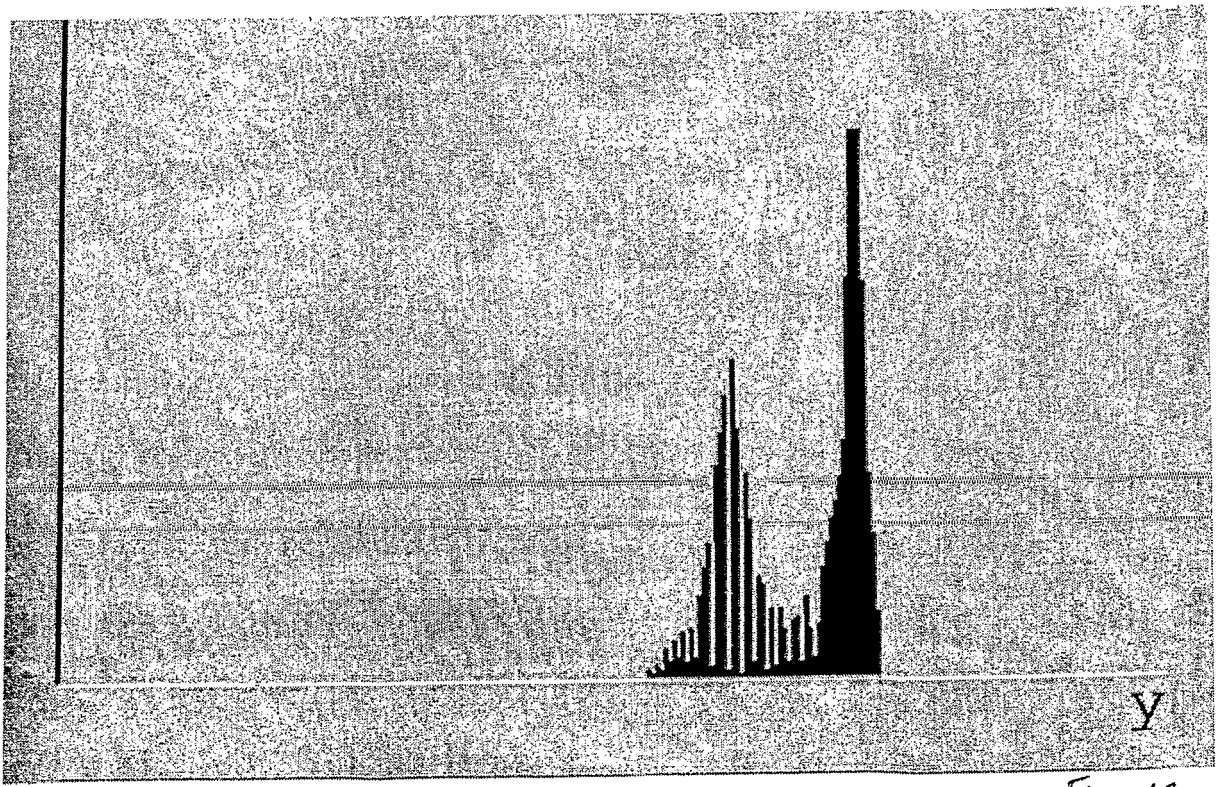


Fig 18



Fig 19

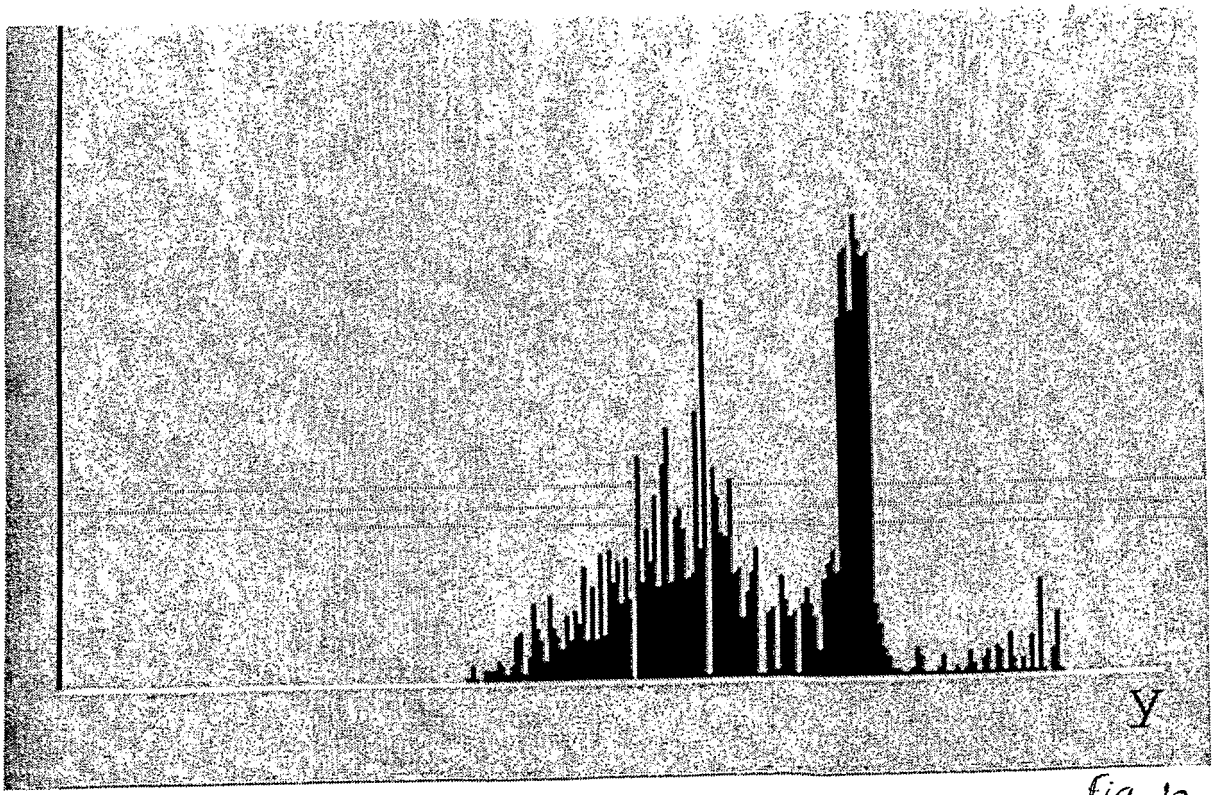


Fig 20

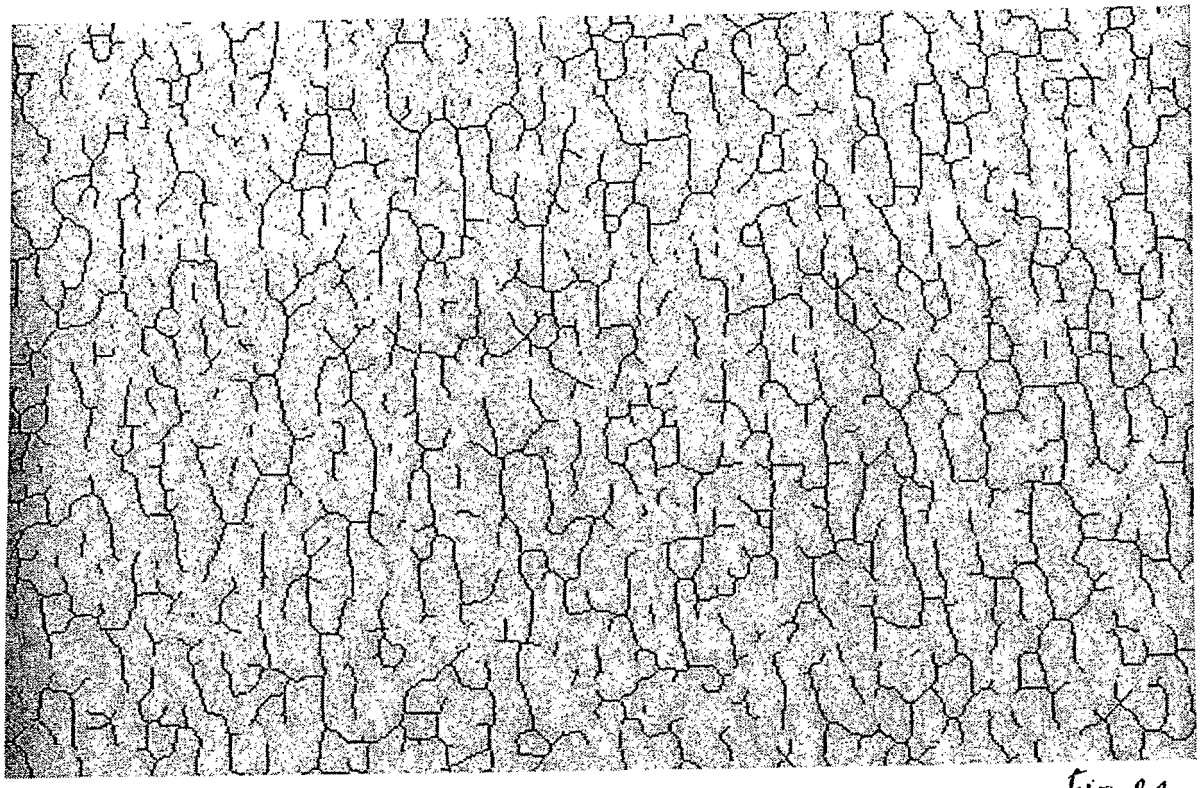


Fig 21

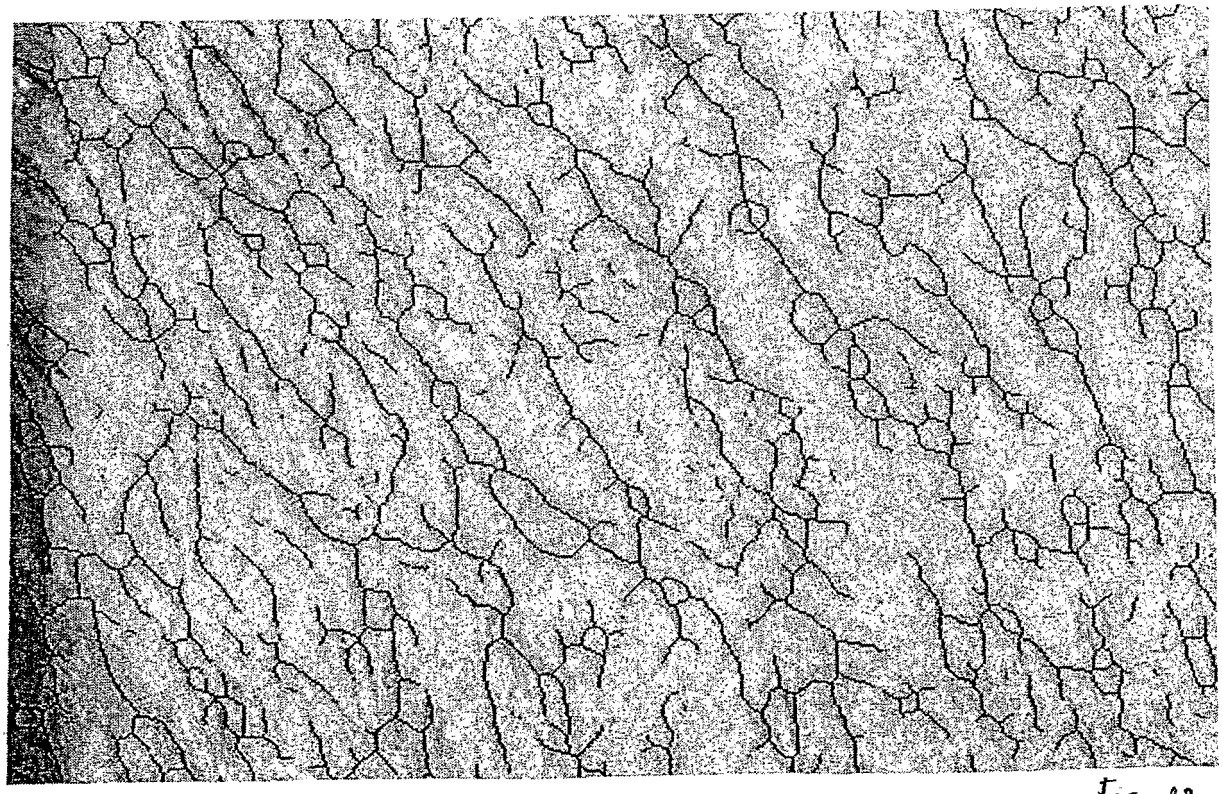


Fig 22

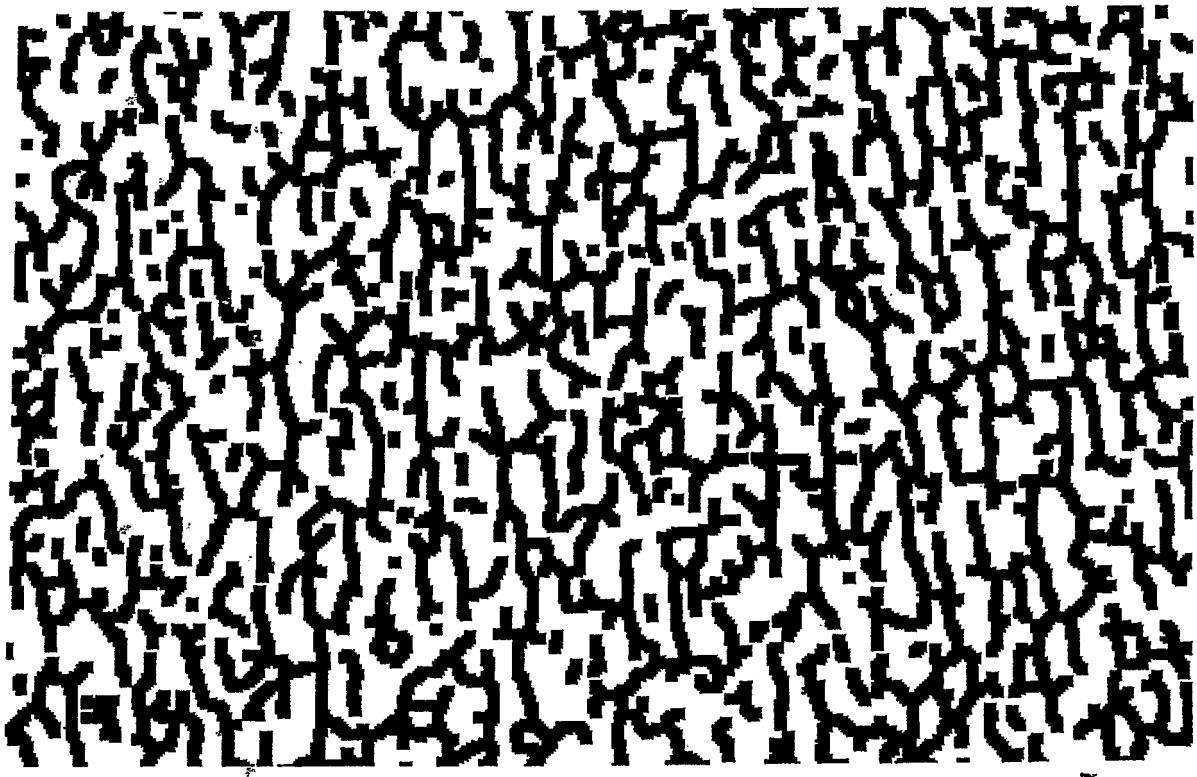


Fig 23

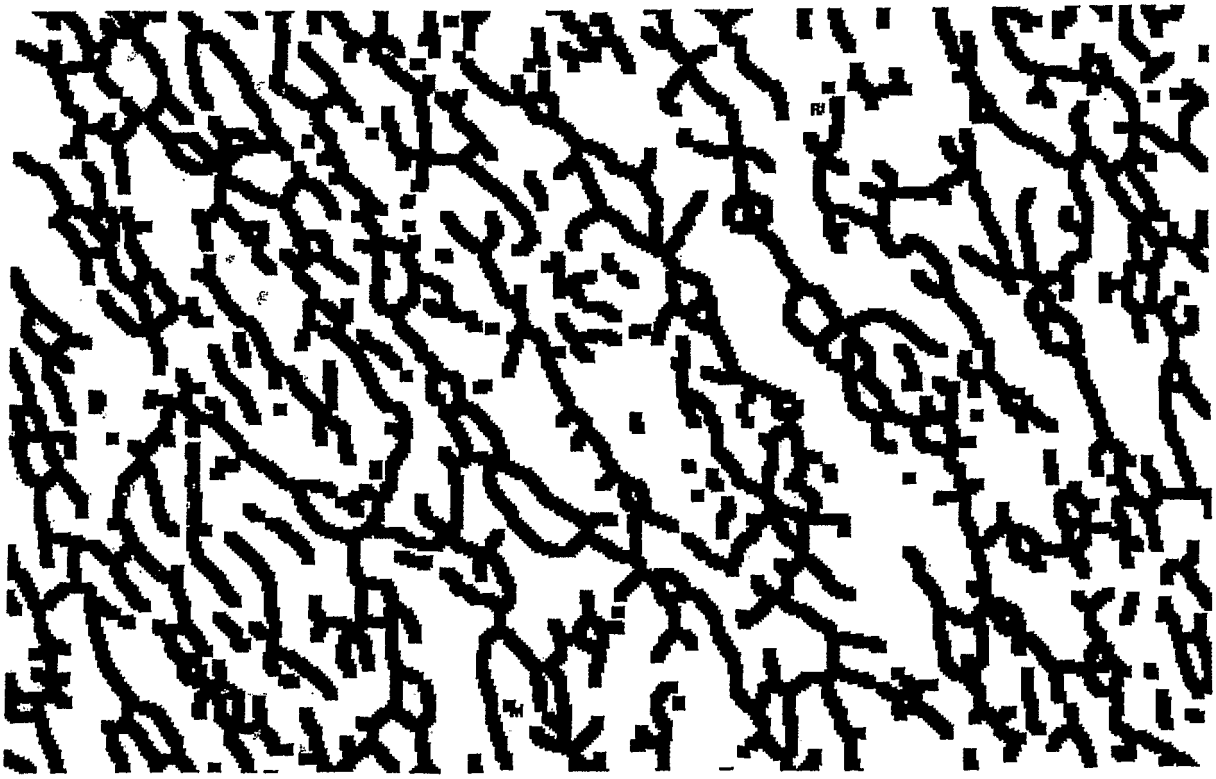


Fig 24

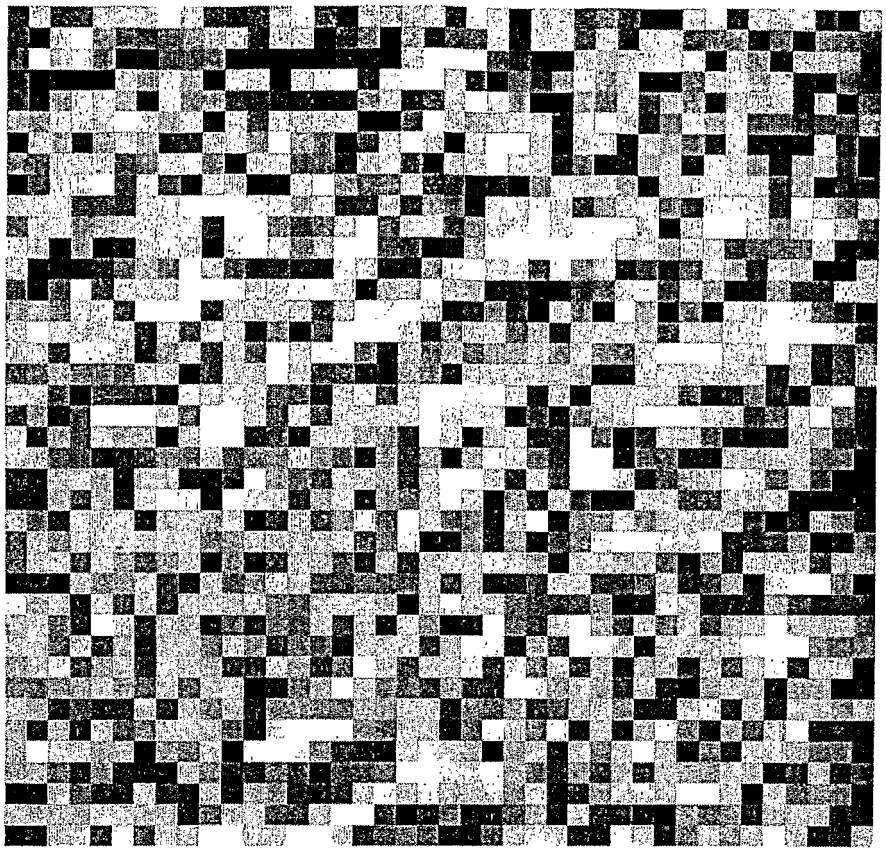


Fig 26

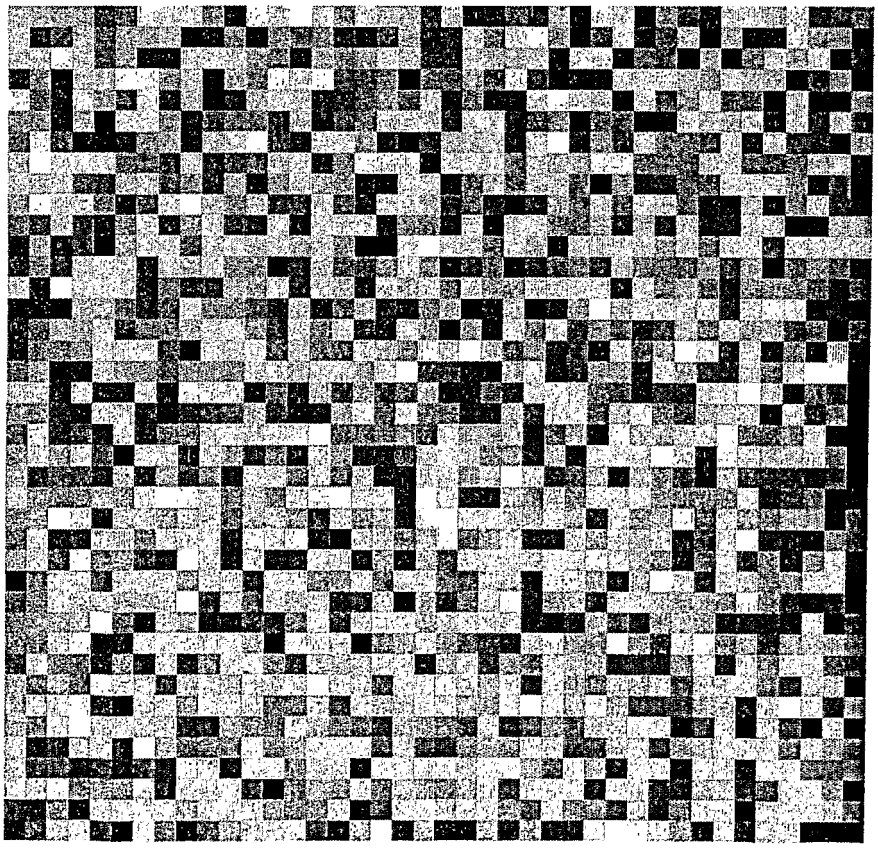


Fig 25

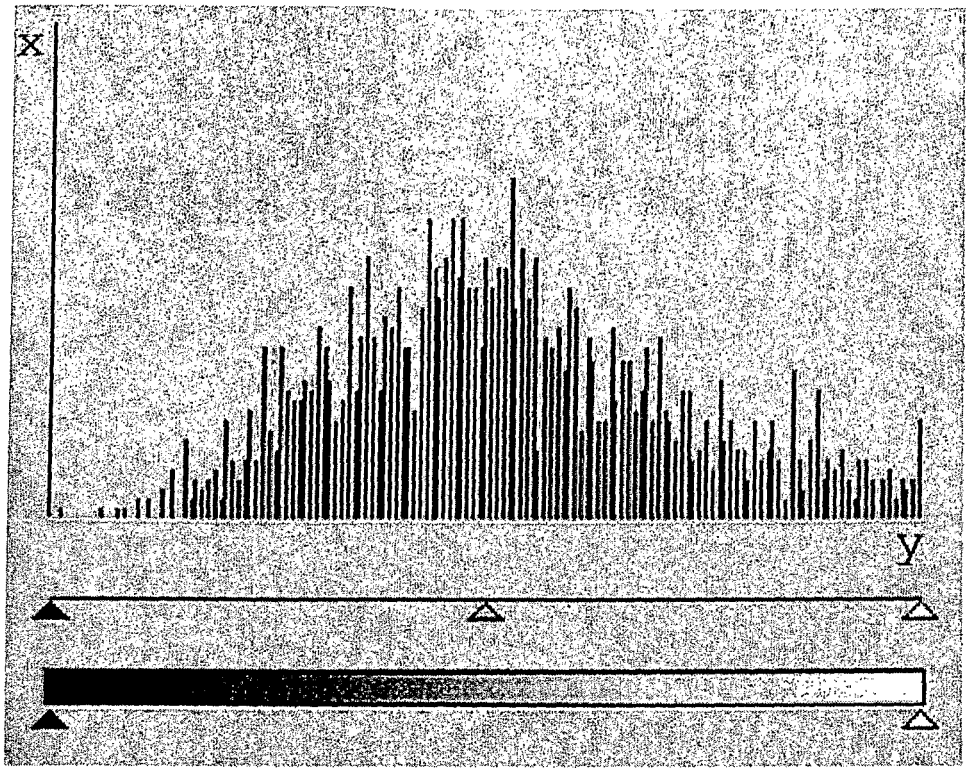


Fig 27

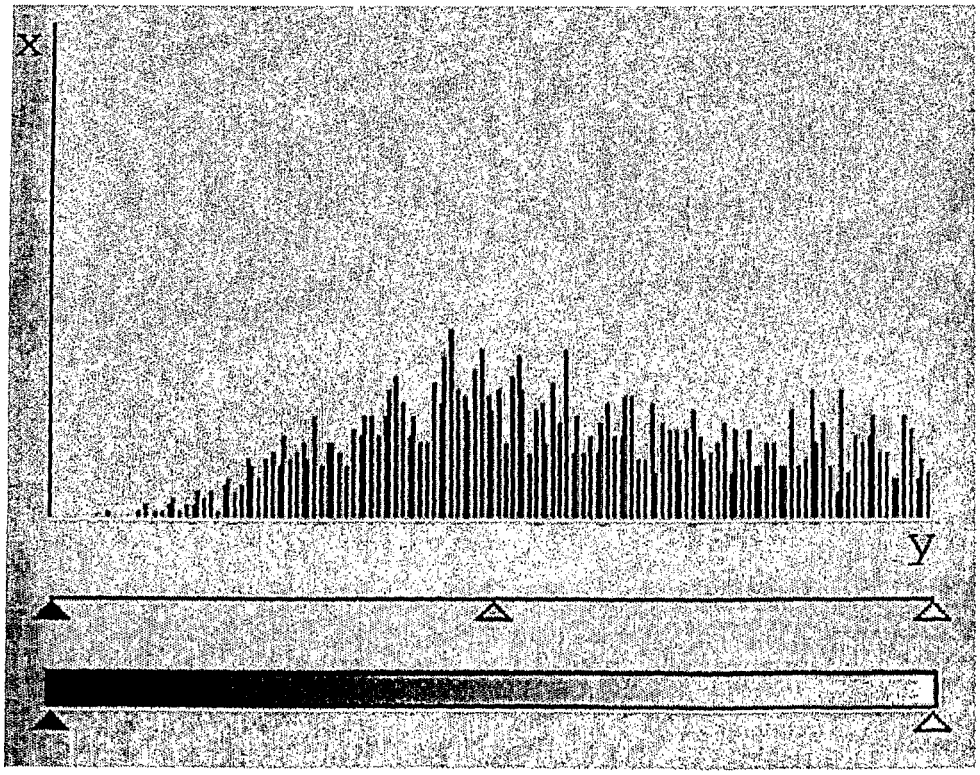


Fig 28