A SURVEY OF TIBETAN PIGMENTS

David and Janice Jackson
Seattle

As students of Tibetan art we had great difficulty finding information in the West on the techniques and materials used by Tibetan painters. Some work had been done on the iconography and stylistic development of Tibetan painting but there was a general lack of information on how paintings were made. This present survey of Tibetan painting materials is a compilation of data gathered through interviews with Tibetan painters knowledgable in the preparation of pigments and still using the traditional methods. Through patient kindness and generosity they opened their doors to us and we were able to get a glimpse of their art and their world.

The Tibetan painter's craft is indispensible for the ornamentation of Tibetan monuments, statues, buildings, furniture and many other objects of religious and secular use. Our study is primarily based upon the usage of pigments in the painting of the *thang-ka,* the famous Tibetan icon-scrolls. But even though the methods for applying the pigments vary for different objects and surfaces, the colors themselves are with few exceptions the same, and hence the following description generally holds true for most kinds of Tibetan painting. Our description of the colors follows the usual order of their application to the *thang-ka.*

The many stages involved in painting a *thang-ka* can be subsumed under two main headings. These are, firstly, the laying down of the colors so as to fill up all areas of the painting surface, and secondly, the finishing through shading and outlining. To these two processes there correspond the two essentially different kinds of paints in the Tibetan palette: mineral pigments (*rdo-tshon* and *sa-tshon*) and organic dyes (*tshos*) respectively. The mineral pigments are not water soluble and must be applied with a glue binder, and therefore we begin first by describing the manufacture of glue.

GLUE (*spyin*)

Glue is made from the skins of yak, sheep or oxen. The yak skin glue is quite strong and that of the sheep has less binding power. To make an even stronger glue, horn can be added during the cooking stage of preparation.

The skin is first washed, the hairs removed, and then boiled a long time. If there is any fat or oil in the skin, it will rise to the surface during the early stages of boiling and this has to be poured off. Through prolonged boiling the skin is rendered

into a gelatinous solution. The solids are strained off and the water slowly evaporated over a low heat until there remains a stiff gel. This can then be cut into strips and strung on a rope until dry. Because glues are not of one standard quality the artist must always rely on a great deal of testing to get the right proportions of glue, water and color. Methods of scientific description sometimes fail even though describing something as technical as mixing paints, because the Tibetan painters themselves do not rely on exact measures or formulas. It was on the basis of years of experience with handling and working with the materials, and then seeing the results of their efforts, that the artists became adept at mixing paints.

The artist usually has a special pot or kettle used for reheating glue. Before the glue is added to the powdered pigments, it is warmed a little with some water in this kettle. Because of evaporation, daily he has to add more water to the pot to keep the proper proportions. With experience the artist can tell by the texture, color, and smell if the glue is dilute enough. It can be tested by putting a little on the palm of the hand or between the thumb and forefinger. By pressing together and pulling apart the thumb and finger, or the palms of ones hands, one can directly determine the tackiness of the glue. After the artist has mixed some paint with the glue, it can be tested more accurately by painting a little onto an unused edge of his primed canvas. By noting the length of time it takes to dry, the artist can gauge the proportion of glue to pigment. If it dries immediately, more glue is needed, and if a very long time elapses the converse is true. Also, glue in excess reduces the covering power of the paint, and the underlying sketches or painting surface will show through. After the paint has dried the next test is to rub the newly painted area with a finger or even scratch it with a fingernail. If it easily rubs off, then the paint obviously lacks sufficient glue to bind the pigment. Finally, a slick, shiny surface indicates an excess of glue, and the long term consequences of this are cracking and peeling.

MINERAL PIGMENTS (*rdo tson*)

MINERAL BLUE AND GREEN (*rdo spang mthing*)

After finishing the sketches (*skya ris*) for the painting, the artist's first task is the filling up of the large areas of sky and landscape with blues and greens. Not only are these two the first colors to be applied, but they also occur together in nature, being the blue and green basic copper carbonates commonly known as azurite and malachite. The main source for these two in Tibet was Snye-mo-thang in Gtsang. Because of its importance, the Lhasa government strictly controlled its mining and distribution, and artists usually got it directly or indirectly through a government office. From this source it was in a sandy form, available in up to three distinct colors: azurite blue (*mthing*) malachite green (*spang*), and sometimes the third intermediate turquoise color (*g.yu-kha*).

Before these can be applied as paints, they have to be cleaned, ground, and separated into several values for each original color. The cleaning is accomplished through repeated scrubbing and rinsing. First the crude sand is poured into a container of warm water and briskly stirred. Allowing it to settle for a few moments, the foam and dirty water bearing the undesirable dust and earth impurities (*sa-shag*) are poured off. A little glue is added to the mineral again, and the earthy mixture is kneaded and rubbed between the hands. To this warm water is added again, and it is agitated, allowed to settle, and the impurities in solution poured off as before. This process is repeated until the water poured off is clear, at which time the mineral may be transferred to the mortar for grinding.

If a great deal of paint is to be prepared, such as when undertaking the painting of whole temples, the grinding pestle can be suspended just above the shallow stone mortar by means of ropes. With such an arrangement, the pestle can be brought to bear on the mortar's surface by lightly pressing down on it, and it can be manipulated for long periods of time with a minimum of exertion on the part of the grinder. But whether supported from above or simply held by hand, the pestle is used to gently grind the mineral which has been put in the bottom of the mortar and slightly colored with water. Before grinding, the crude earthlike minerals are dull and unattractive. But with cleaning and just a little grinding the rich colors appear.

It is not necessary to grind azurite or malachite any more than just enough to reduce the larger particles to fine sand. In fact, it is better to grind it not enough than too much. Unlike lapis lazuli, the ancient source of ultramarine, azurite and malachite become progressively whiter the finer they are ground, and if ground as finely as most pigments are, they lose their original color almost completely. Grinding reduces the original mineral into particles whose size gradation is from fine sand to very fine dust. Because the different values of color correspond to the size of the particles, several lighter and darker values can be extracted through sedimentation. This may be accomplished by agitating the ground powder in water, When most of the heavier, darker particles have settled to the bottom, the water and the lightest particles still in suspension are poured into a separate dish. By adding more water to the darker heavier remains and stirring them up again, the whole process can be repeated several times, with the result that from one mineral at least four distinct shades can be derived, each known by a separate name. The first, lightest suspension of malachite is known as *sngo-si*; the next, sky-blue suspension as *sngo-sang;* the third, medium blue as *mthing-shul*; and the darkest azure bottom remains as *mthing-'bru.* Likewise the four gradations of malachite are, from lightest to darkest: *spang-si, spang-skya, spang,* and *spang-smug.*

In Tibet these two minerals were not extremely expensive per unit of weight, but because they were used in great quantities over the large areas of earth and sky,

and since they had to be applied fairly thickly to achieve the deeper colors, they used to account for a great portion of a painter's expenses. To get, for example, the deepest azure blue, the most coarsely ground azurite pigment is used, and it has to be applied several times, waiting each time for the previous coat to dry before applying the next. When the last coat has dried, the area is moistened very slightly with water, and then rubbed gently with a burnishing tool. This smooths and evens the otherwise thick, granular layer of paint. Also a slightly greater proportion of glue is required for these coarsest of pigments. On the other hand, the lighter, more finely ground shades of azurite and malachite are mixed in the same proportions with glue, and applied in the same way as any other pigment. We are told that the lightest shades of malachite green (*spang-si*) and azurite blue (*sngo-si*) were used in older *thang-ka* painting styles as an under-coat for areas depicting such things as rocky crags, over which afterwards the deeper azurites and malachites are applied. This is seldom, if ever, done today. And in fact, as the last supplies brought out from Tibet become exhausted, and in the absence of any new sources in Nepal or India, the use of these two pigments, whose attractive qualities are lauded by Tibetan painter and discerning foreigners alike, is now in great peril of becoming extinct.

LAPIS LAZULI (*mu-men*)

A myth persists among art historians that lapis lazuli (*mu-men*) was used as a pigment by Tibetans. Both the semi-precious lapis lazuli and azurite blue were known to the ancients, and in fact 'azurite' and 'lazuli' share the same etymology. Their similarity in color contributed in Medieval Europe to the not uncommon adulteration of the precious ultramarine pigment (the purified coloring principle of lapis lazuli) with the less costly azurite. Yet these two can be easily distinguished by a variety of simple tests. The two minerals themselves are of quite different appearance, composition and hardness. Within a single specimen of azurite one also commonly finds traces of the green malachite, while the typical lapis specimen has spots and veins of related white sodalite minerals and the very characteristic gold specks of pyrite. The chemical composition of lapis is complex, being mainly of sodalite minerals, while azurite is the relatively simple basic copper carbonate. Medieval painters knew of the two minerals' chemical differences in that they knew lapis to be stable even at high temperatures while azurite, if heated red-hot, would turn permanently black. In terms of hardness, azurite can be as soft as 3.5 on Moh's scale, while lapis is much harder at 5.5.

Considering that Tibetan painting requires great quantities of blue, it is improbable that Tibetans could have afforded to import lapis in sufficient quantities to meet the demand. Lapis was quite costly when refined into a pigment, because only the pure blue portion was suitable for a pigment. It is well known that in Medie-

val Europe the pigment prepared from lapis cost weight for weight as much as gold. But, as mentioned above, azurite was quite accessible to Tibetan painters and relatively inexpensive. So there is little doubt that azurite was the main blue pigment of Tibet. Yet any remaining sceptics cannot fail to be convinced if they consider that the presence of malachite green in Tibetan painting is unquestionable, since in nature there are no other stone pigments exactly like it in either color or properties. Hence the use of its sister pigment, azurite, with whom it is almost always found in nature, can be safely inferred.

VERMILION RED (*mtshal*)

Tibetan artists use both native and synthetic mercury sulfide for their red. The native mineral, cinnabar, is known as *cog-la* or *mtshal-rgod* in Tibetan and it occurs naturally in some parts of South-East Tibet. It is easily recognizable by its reddish metallic appearance and extremely heavy weight. If the mineral quality has impurities it can be washed after grinding in the same way that the blue and green pigments are cleaned. Although it is metallic it is one of the softest of all the Tibetan pigments and is easily ground into a powder in a mortar or even in a cup. The artists claim that cinnabar has to be very carefully ground because it has the peculiar properties of tending to turn whitish if ground with circular movements and of turning reddish black if ground with an up and down pounding motion. To get a pure red, both methods are used equally. It is best to do the grinding slowly and with only a little water. To make the finely powdered mineral into a paint, only the addition of the proper amount of glue is necessary.

Also available previously in Tibet was a synthetic mercury sulfide called *mtshal* or *rgya-mtshal*, the '*rgya*' signifying that it was from India or China, both which had the technology for synthesizing it since ancient times. This is known as vermilion in the Western artists' palette. It can be obtained either in a powder or an artificial metallic crystal which has to be rendered into a powder just like the native cinnabar. Synthetic vermilion is generally purer than native cinnabar. Yet it is sometimes adulterated with cheaper red coloring matter. But since the pure product has the characteristic brilliance combined with great weight, by these standards alone an artist may be sure of getting a reasonably pure product. However pure the pigment may be chemically, to be of the first rate for Tibetan painting it must possess the brilliant scarlet hue, and some grades of obviously pure vermillion, when mixed with with glue and applied to a surface, instead of being brilliant, become a muted rather dull maroon red, and hence these are not valued so highly. Perhaps such darker vermilion results from improper grinding techniques.

MINIMUM ORANGE (*li-khri*)

For their main orange pigment, Tibetan painters used powdered minimum or

"red lead", a synthetic tri-lead tetraoxide. It was not produced in Tibet but imported as an already powdered pigment from Nepal, India and China. Tibetans also know it by its name in Sanskrit, *sindhur,* and the technology for exidizing lead was known to the world outside Tibet since ancient times.

The purity could be judged by its weight, color and texture. The best and purest qualities are extremely heavy, intensely orange, smooth to the touch and not sandy. The pure powder will squeak when rubbed between the fingers. Its characteristics can not be duplicated by any other orange pigment but the purity can be tampered with. In cases where the artist has to work with grades other than the best, he can wash out the impurities by the same washing processes used for the blues and greens. This powder does not require further grinding, and if pure only the addition of a gluebinder is necessary. First, just enough glue solution is added to saturate the powder and these are rubbed against the side of a small bowl with a wooden stirring stick or with the fingers until they form a smooth putty. Then, a little more glue is added to bring it to a pasty consistency, all the while stirring constantly. Finally, enough glue is added to bring it to the consistency of cream and it is set aside for a short time before testing it on an unused section of the painting surface, as described above.

ORPIMENT YELLOW (*ba-blae*) and REALGAR (*dong-ros*)

The mineral yellow used by Tibetan artists is called *ba-bla.* This is arsenic trisulfide, known in the West as orpiment. It is native to Tibet and the most famous deposits of it are in East Tibet near Chamdo. The pigment is easily identifiable by its yellowish metallic lustre and strong sulphur-like smell. It is also quite heavy and very soft (1.5–2.0 on Moh's scale). There are a variety of qualities, some of the poorer grades being greenish and the best a pure yellow.

Another compound, arsenic disulfide, was the orange-yellow realgar known to Tibetans as *dong-ros.* Like most of the mineral pigments, Tibetans used these two compounds in medicines as well as pigments, in spite of their poisonous naure. They say that an artist new to the trade may experience diarrhea when first using these pigments. But apparently the amounts injested through habitual licking of the brush tip had no other immediately harmful effects. Some painters carefully avoided injesting any at all, while others denied it was a poison.

To prepare the pigments from these two arsenic compounds, first the mineral is ground to a powder in a mortar and then the powder is put into a small crockery paint pot. A little drop of glue is added and worked into the powder until it is absorbed. Little by little more is added until a paste results. At this point the artist can add as much of the glue-water mixture as is required to make a suitable painting consistency. Realgar was not used very often for the *thang-ka* but it has a wider use in

wall paintings. Usually for wood surfaces and monastery walls, a slightly thicker paint is prepared than that used on *thang-ka*. The color of realgar can be easily duplicated by adding yellow orpiment to orange minimum.

YELLOW OCHRE (*ngang-pa*)

Yellow ochre is the western artists' name for yellow varieties of the mineral limonite, a natureal hydrated ferric oxide. This pigment is not used very much as a color in its own right on the *thang-ka*, where the brighter orpiment is preferred. But it has extensive use as an undercoat for gold (*gser-rten*) and also in the painting of walls. In Tibet, a highly prized yellow ochre (*ngang-pa* or *ngang-sang*) was found in Zhwa-la district in the province of Gtsang, hence its name, *zhwa-lu-ngang-pa*. Because of its very soft, earthy consistency, only a little grinding was required in its preparation. To obtain a superior grade pigment some artists would first soak ocher in water and then rub it with their fingers to obtain a silky powder, instead of grinding it.

EARTH COLORS (*sa-tshon*)

Earth colors can be obtained locally almost anywhere in Tibet, and as might be expected, they are of various qualities. Earth colors are used on a large scale for the painting of the outside of monasteries, houses and monuments. Although for such use little preparation is necessary, the qualities used by artists are of a much finer grade and have to be carefully selected and finely ground. For the most part this can be done easily because the earth colors are very soft. Sources of the better qualities are but few, and hence they must be transported to various places in Tibet for artists' use. The two most famous earth colors are the yellow ochre of Zhwa-lu just mentioned, and the following white *ka-rag*. However, other colored earths are also in widespread use, the most common of which is red ochre (*btsag*). Other earth pigments which have little or no use in the fine arts, but which are used extensively for house painting and the like, are dark red ochre (*btsag-smug*), low grade white wash (*sa-dkar* or *dkar-rtsi*), and a kind of bluish mud or clay (*'das-sngon* ?).

In Tibet, where the use of the splendidly intense primary hues strongly prevails, the ochres, umbers, etc., never attained a fraction of the popularity that they enjoyed in European painting. Red ochre, which is a fine-grain earthy form of the natural feric oxide, hematite, is in Tibet mostly relegated to being daubed on the walls of buildings. Red and yellow ochre are chemically identical except for the presence or absence of water in their composition. Yellow ochre, the coloring principle of which is hydrated iron oxide, can be artificially changed to a red ochre, the non-hydrated oxide, by heating. Tibetans know this technique and use it to turn pale yellow ochre a brighter orange shade by heating (literally "burning" : *sreg-pa*) it in a kiln (*thab-kha*). Such artificial dehydration is precisely what is meant in Wes-

tern terminology when we speak of, for example, "burnt" umber.

CALCIUM WHITE (*ka-rag*)

The white paints of Tibetan artists are all calcium minerals, probably consisting mostly of calcium carbonate, the main constituent of limestone, marble and chalk. Whites of this type are available throughout many localities in Tibet, but the most well known and highly prized deposit was in Rin-spungs, a place in Gtsang which in the 16th century ruled Tibet. According to Tibetan nomenclature there are two varieties of this calcium white (*ka-rag*) which they designate masculine (*po*) and feminine feminine (*mo*). The masculine type (*po-rag* or *po-dkar*) is harder and coarser while the feminine type (*mo-rag* or *mo-dkar*) is relatively soft and fine. If the masculine variety is left out to weather in a stream bed or a wet place, it converts to the feminine, becoming lighter and softer. If an artist wishes to affect this change, he soaks the harder form in water for several days. At first the water becomes yellowish, and when this happens the old water must be poured out and replaced with fresh water until no yellowing occurs. This, combined with its greater hardness for grinding make the masculine type more work to prepare, but when finally rendered into a form suitable for painting there is no quality distinction between the two.

This white pigment is not identical with the commercially available chalk of India, and the artists report that similar chalks were available in Tibet and had other use in Tibetan painting, particularly in the techniques used in executing the black *thang-ka*. Nor was this pigment ordinary limestone, which was also quite common. Unlike limestone, which is not a bright white until converted to lime (*rdo-zho*) by firing in a kiln, *ka-rag* is white in its original form. Calcium sulfate, occuring as gypsum and alabaster, has been used by artists of other cultures for a white pigment. Also some Eastern Tibetan artists use a white derived from bone ash, the principal inorganic constituent of which is calcium phosphate. So it seems possible that *ka-rag* may be a mineral of primarily calcium carbonate containing traces of other calcium compounds.

The preparation of *ka-rag* differs little from that of other pigments, except that after grinding both varieties must soak in water as described above in order to leach out any yellowing impurities. After this, poorer grades of this and also all cheaper pigments in general are transferred to earthenware pots which speed the extraction of excess water. For expensive pigments, non-porous containers are used to prevent any pigment being lost into the earthenware vessel. When the pigment has been well cleaned, and ground the artist can use a variety of tests, sometimes including even testing the texture with the tongue and feeling the soaked powdered mineral to detect any undesirable granularity. Finally it is mixed with glue and ready for use. In Tibet, inferior grades were used for priming painting surfaces, since the fine grades

from Rin-spungs were quite expensive, costing as much as butter in the village of one of our informants. And, in any case, its finer characteristics were not required for an undercoat. For this purpose most locally available whites would do. We are told that for making white primer for sizing the *thang-ka* canvas, approximately two measures of *ka-rag* are added to every measure of glue-solution. However, we have not tested this proportion ourselves, and one must keep in mind the variance in glue strengths when combining glue with any of the powdered pigments since it is not a constant.

GOLD (*gser*)

Tibetan artisans use two techniques to apply gold. The first, cold gilding (*grang-gser*), is used both for paintings and clay papier-mâche images and in special circumstances even on metal surfaces. The second method, hot gilding (*tsha-gser*), is used only for metal objects, but because of its interest we have also included a brief description of it.

COLD GILDING (*grang-gser*)

Gold for painting is obtained in three forms: solid ingots of pure gold, gold leaf (*gser-shog*) and finely ground gold dust (*gser-rdul*). A fourth form results when gold dust is mixed with a binder and poured into drops which are dried and kept until needed. But before grinding first the tiny specks of gold must be mixed with mercury (*dngul-chu*) which helps to hold the gold together during grinding. The gold and mercury mixture is poured into a large shallow stone mortar like the ones still in use grinding spices in many parts of Asia. To this is added water and fine pieces of calcite or limestone which act as an intermediate grinding agent. This also facilitates the grinding by preventing the gold from adhering to the mortar or pestle. The crushed calcite must be constantly renewed since it is quickly reduced to a milky paste in the process of being ground between the hard stone mortar and pestle. This milky paste is gently rinsed away with water, while the heavy gold and mercury remain at the bottom of the mortar.

Gold leaf is obtainable from India in books of small squares. Gold leaf is the intermediate step in the preparation of gold paint from solid gold. Commercially prepared gold leaf is so fine that it can be directly converted into a gold paint without having to be ground with mercury. But this, too, is a ticklish process involving first mixing the gold leaf with a little honey and then rubbing it against the side of a cup with the thumb until it becomes a smooth paste. This requires a certain special touch because the natural tendency of the gold leaf is to clump up and not to dissipate into fine particles.

Gold is also available in finely powdered dust. The exact methods for preparing gold powder from solid gold was a closely guarded secret known only

to a few Newar goldsmiths residing in Lhasa who monopolized the business. The names of these establishments, as for example the East Blue Door and West Blue Door (*sgo sngon skar nub*), were well known to the painters of Central Tibet. The process they used for powdering gold reportedly begins in the same way that gold putty for hot gilding is prepared. The gold is beaten into gold leaf which is then cut into very thin ribbons. These ribbons or threads are then snipped into tiny specks with scissors. The crucial step is the pulverizing of these specks into fine dust, a grinding process which is thought to be done in a glue medium. However, this is an exacting undertaking probably involving an even more refined process, a fact which was painfully discovered by the artists painting a recently constructed temple in Baudda, Kathmandu. After blackening twelve tolas of gold they finally purchased the required gold dust from the Newar proprietors of one of the above mentioned shops, which are still in business in Kathmandu. From them gold can be obtained in both powder and as dried drops which have been mixed with a little glue.

Gold in powder form quite often has some dark impurities or adulterants and to obtain the brightest sheen these have to be removed by washing. For this, first a little glue is added to the gold powder in a cup and it is rubbed with the thumb or finger until almost dry. Then a little warm water is added and it is stirred again. The gold dust is then allowed to settle to the bottom of the cup and the dirty liquid poured off. More water is then added and the process repeated until the run-off water is clean.

The clean gold powder can either be stored as such until used, or else it can be prepared into a more covenient form by mixing with a binder and then drying. This type of gold paint in the form of pellets or drops is mentioned above as the fourth form of gold. This form is not only convenient but it is also quite popular with pilgrims and Buddhist devotees. For in this drop form, a pious person can immediately and easily offer a fixed amount of gold to a sacred image or shrine, much in the same way that gold leaf is offered in Southeast Asia. These gold drops are made by Tibetans by mixing powdered gold with some binder. This mixture is then slowly poured, drop by drop onto a smooth surface, and allowed to dry. If quicker drying is required, the drops can be poured onto a smooth board of unfinished wood and the drops will quickly solidify through water being absorbed into the wood as well as through evaporation into the air. For the painter as for the pilgrim, all one needs to do is dissolve some in a little water and it is ready to be applied and, only rarely did extra glue need to be added. Two types of binders are used for the cold gilding method. One is the usual glue which is derived from animal skins. Naturally this has little appeal to those concerned that their offering of gold be a source of the greatest merit and hence be, as much as possible, unsullied by such defiling acts as taking an animal's life.

For this reason, and probably not on account of any weakness of the ordinary glue, a vegetable derived binder is also in use. This seems to be a sort of glutinous extract of sesame (*zar-ma*) which is produced by first soaking it in water and then cooking it. But the use of this binder was mostly restricted to statuary, and its use in *thang-ka* painting must have been quite rare. One slight advantage this binder seems to have is that the proportion of binder to glue is not so critical to get a reasonably stable result, whereas an excess of the regular glue is apt to cause peeling.

Nevertheless the sesame binder was highly unsuited for *thang-ka* painting because the fine gold details of brocades, etc., demand a very thin, runny paint, while the seasame binder tends toward the other extreme of being thick and stringy. Painting surfaces must be prepared before gold can be applied. In the case of metal surfaces this means thorough cleaning, while for most other surfaces on ochre gold-base (*gser-rten*) is applied as an under coat for gold. As a foundation (*rten*) for gold paint (*gser*), ochre was preferred over other paints. Since yellow ochre itself has a subdued golden hue, an undercoat of it lessens the amount of real gold required to achieve the desired effect. And this base coat is also used even for powdered brass imitation gold (*rag-rdul*). Other gold bases are also in use, one of which is a mixture of orpiment yellow (*ba-bla*) and calcium white (*ka-rag*).In addition, some artists prefer to use a flesh-tinted bass coat on the areas designated for gold, on wood or clay/papier–mache statues. This is made by combining yellow (*ba-bla*), white (*ka-rag*) and red (*mtshal*). We also noticed a case where, over a yellow ochre base coat, imitation gold was used and then real gold was painted over it as a final layer.This was done on a mural in a monastery where the use of the imitation gold spared much of the expense and the effect was the same as if completely done with real gold. For *thang-ka* painting the most beautiful results were achieved when the gold is applied in three successive thin coats rather than in just one thick covering.

The use of gold leafing exists mostly in conjunction with woodwork and furniture, but gold leaf is never applied directly to the *thang-ka*. Before applying gold leaf to a surface, on top of the usual ochre base a special glue and sugar adhesive is first applied. This particular mixture is prepared by slow boiling over a long period of time. Sometimes the leaf will be applied in this fashion over other coats of colored paint. Then a design can be scratched into the gold surface with a needle, revealing the colors beneath. This is called 'needle drawing' (*khab-ris*).

HOT GILDING (*tsha-gser*)

A special more permanent method of gilding is used for metal images and metal religious implements. This is the hot method of gilding (*tsha-gser*). Its advantage is that statues and implements so gilded may be cleaned and polished without rubbing off the gold. This is also a practical method used on jewelry and metal work of all kinds.

Preparation of the metal surface consists primarily of cleaning it, either with ashes or nowadays with a chemical solvent. This having been accomplished next a special gold putty is prepared by mixing gold powder with mercury. An alternate and longer process is used to make the gold putty from cheaper solid gold. Then the clean surface is coated with pure mercury until it shines like silver. The gold and mercury putty is then applied over the mercury coated metal. Finally the metal object is slowly heated gilded side up over coals to evaporate the mercury, and the surface is then polished to a brilliant sheen, with a smooth steel rod or another burnisher. If the object is large, as for example a large copper statue, the gilding is done in small pieces, which are assembled afterwards. Often the faces of images are not hot gilded, but the gold is applied by the cold method and left unburnished for a matte appearance. This creates a striking contrast between the softly glowing face and the rest of the brightly gleaming statue.

THE GOLD THANG-KA (*gser-thang*)

Gold *thang-ka*-s are scroll-icons in which the surface is a solid layer of gold paint, upon which the figures are indicated by line drawings with red vermillion (*mtshal*). As might be expected, beneath the gold a layer of ochre gold-base is first laid down, and after that the surface is uniformly coated with a gold paint composed of gold dust and glue. On top of this the artist draws or stencils on the composition, although one of our informants draws an ink sketch on the primed canvas beneath the gold and then traces it on to the gold by holding up the canvas to a source of light. The actual painting of figures is done primarily with red lines and some small areas are covered with dark blue, black and white. Any shading of the gold *thang-ka* and on gold figures in general is done with lac dye (*rgya-tshos*).

Finally it is finished by burnishing and selective etching of designs with the point of a burnishing tool. Nowadays on the ordinary *thang-ka* almost every area of gold paint is burnished to a shine, except where special contrast is required. But we are told that in older *thang-ka* painting styles very little burnishing was done. The shiny polished effect was reserved for the depiction of objects which in real life are shiny gold, such as gold ornaments and jewelry. Otherwise, special effects are achieved by drawing glittering lines with the burnisher tip over areas which are otherwise left matte. Burnishing of the gold on the *thang-ka* surface must be done with care. To avoid gouging the canvas, the artist holds a burnishing support (*gzi-rten*) behind the canvas with one hand as he burnishes with the other. This support may be a smooth, flat piece of glass or mirror or even just a smooth piece of wood. The painter completes all the burnishing of one area before proceeding to the next,and in so doing systematically covers the entire surface. The favourite burnishing tool is the *gzi* stone, a small cylinder of banded onyx. Many folk beliefs exist in Tibet concerning the power,

both curative and magical, of these stones. Hence they are preferred over more common but equally suitable agates. In addition, a smooth tooth, a silicous stone, or even a suitable shaped piece of hard metal can be used as a burnisher. Some artists have elaborately chased retractable *gzi*-stone burnishers, and of all the tools used by Tibetans painters, his burnisher was often his most valuable and elaborate.

ORGANIC DYES (*thos*)

After the mineral pigments have filled the painting area (*tshon-kha-bskang*) the finishing steps (*'jug-rkyong* or *gzhug-rkyong*) of shading and outlining are done. For this second stage, few if any mineral pigments are used, and the colors applied are all dyes, the two most important being lac-dye (*rgya-tshos* or in literary Tibetan: *rgya-skyegs*) and indigo (*rams*). The advantage of dyes at the finishing stages is that they are much thinner, not requiring any glue, and hence are ideal for fine lines and shading washes.

The above description holds true for the main painting technique (*tshon-chen* or *rdzogs-tshon*) in which the shading (*mdangs*) and outlining (*bcad*) are not executed until after the mineral colors have been layed down. However, this neglects to mention a type of wet-shading (*rlon-mdangs*) which is done when applying the mineral pigments. Wet-shading is done by intermingling areas of still wet mineral paints to bring about a gradually shaded transition between the principal colors. This is an easy short-cut technique for the skilled painter, but on finer works most of the shading is reserved for the period following the application of the main coats of color. The latter type of shading is known as dry-shading (*skam-mdangs*) since the point is applied over a dry surface. This is a more time consuming process, where instead of instantly blending two wet colors, the dye or pigment must be applied several times, allowing for drying between each application. Finally, there exists another altogether different painting technique (*hang-tshon*) which consists entirely of black outlining and thin washes of colors. In this, dyes such as indigo and lac dye may be used alone as the principal coloring agents.

LAC DYE (*rgya-tshos*)

Lac dye is a red dyestuff widely used in India and neighboring countries which is produced from resins secreted by the tiny lac insect (laccifer lacca). The lac insect is a species of scale insect, so named bacause the resinous products they excrete are deposited in tiny scales on branches and twigs of several varieties of soapberry, acacia and fig. The name lac derives from the Persian *lak* or the Hindustani *lakh*, meaning one hundred thousand, because of the immense number of insects required to produce a single pound of shellac. Chemically the dye is lacaic acid which is related to carminic acid found in cochineal. Lac dye became commercially important

in the 17th century (even before the introduction of shellac, lac's resinous by product) when the East India Company exported it to Europe.

Tibetan artists sometimes receive the dye in dry pellets, and sometimes from China as wafers of compact cotton which have been saturated with the dye. Otherwise Tibetans know very well the means of extracting the dye from crude forms of lac. Sticks encrusted with insect scales, called stick-lac, are obtained from the Himalayan border regions. Artists can also get the dry insect scales already removed from the twigs. If the stick lac is obtained the artist must first carefully scrape on the scales and remove any debris, because if boiled with the stick it will produce an inferior quality dye. Once removed, cleaned and crushed, the lac-scales are cooked in hot water to melt them and bring the dye into solution. The pot used should not be a metal such as copper because the dye tends to blacken them, presumably in combination with the metal ions. Also, care must be taken not to overheat the lac, because this will blacken it and then spoil the whole batch. If a single leaf of the *zhu-mkhan* plant is added it greatly facilitates the extraction of the dye. They believe that somehow it acts also to fix or make permanent the color, much in the same way as borax (*tsha-le*) which is also added in small quantities if available. The dye soluton is then poured off from the resins and solids, and the water is carefully evaporated over a low heat to yield the dye. This can be reconstituted when needed by mixing in a little warm water, or if needed immediately, the concentrated dye solution may be applied directly without waiting for complete evaporation.

INDIGO (*rams*)

Indigo is a dyestuff obtained until about 1900 entirely from plants, and mainly those of the genus Indigofera. At the turn of the last centrury the development of comparatively cheap synthetic indigo wrought economic havoc in India where huge areas of land were devoted to growing it, and nowadays almost none is cultivated. Tibetans used to import it in slabs or chunks of already prepared dye from Nepal and India. Indigo is available in a variety of qualities. The best is light and easy to break or crumble. If broken, the best grades reflect light from the newly exposed surfaces with a red tinge. If a little is moistened and rubbed between the fingers, it dyes then a dark blue-black which is not easily washed off. Another test is to scratch it on the thumbnail, and the best qualities will leave a dark black streak. A variety which fails the above tests is useful in fabric dying but unsuitable for the *thang-ka*. This is known as *ha-rams*.

In preparing indigo for painting, the most important thing is that it be extremely well ground. Prolonged grinding not only results in a smoother ink-like consistency, but it is also said to improve the color because the longer it is ground the darker it becomes. Strictly speaking, indigo does not require any glue as a dinder.

But if a little glue is added it is said to facilitate the grinding process. To grind indigo, first it is pounded into a powder and then moistened to a dough-like consistency. This is then ground in a mortar until almost completely dry. Next it is moistened again and grinding is resumed. This process is repeated many times and sometimes a batch of indigo may be ground for two days or more. Also, when completely ground the presence of a little glue improves its quality as a paint. This is because the indigo in solution with water tends to coagulate in the paint pot as the water dries out, but this process is arrested and the indigo held in an even suspension much longer if a little glue is added.

As a dye, in painting indigo is well suited for outlining and shading. In almost every instance on a traditional *thang-ka*, where it appears that ink has been used for outlining, in fact it is indigo which has been used. It was superior to China or India ink in that, if properly prepared, it was less prone to running or streaking even if some water spilled on it. Traditionally it was used to reinforce the first sketch (*so-ris*) which was drawn on with charcoal. In the final stages of the painting it is used for outlining and finishing areas of red, green and blue, while lac dye served a similar purpose for areas of orange, yellow, and flesh color. Either lac dye or indigo can be used on white areas, depending on the object depicted.

Lastly, indigo is important in preparing the ground in the black *thang-ka* technique. From the beginning ink is mixed in with the white sizing for the *thang-ka* canvas (*thang-ras*), and if this is not done initially, then a coat of ink is applied over the primed cloth surface. But in either case a final coat of indigo must be applied over the ink to get the optimum rich, colorful black.

OTHER VEGETABLE DYES (*shing-tshos*)

Besides the primary dyes from lac and indigo, a wide variety of other dyes may be used as the need presents itself and as they are available. All dyes, with the notable exception of indigo, require some sort of additive to fix the dye in a mechanism perhaps to that used in making 'lake' pigments, as for example crimson lake. Many popular sayings evolved around the necessity of these additives in dye production, probably the earliest recorded of which is found in one of the first of Sa-skya Pandita's (1181–1251) famous aphoristic sayings (*Sa-skya legs-bshad*). Here he refers to the necessity for soda (*bul-tog*) to be added when dyeing with madder (*btsod*). Another saying we heard concerning the necessity of *zhu-mkhan* is that, "without *zhu-mkhan*, lac dye is weaker than water" (*zhu mkhan med na rgya tshos chu las sla*). Likewise, most other dyes require the addition of a few leaves of the *zhu-mkhan* (literally : "that which makes things melt or dissolve") and or borax (tsha-le). A Tibetan doctor told us that the Nepeli equivalent for *zhu-mkhan* is *tejpat*, a word the dictionary defines as 'leaf of cassia'. Cassia denotes a genus of herbs, shrubs and trees within the family Caesal-

piniaceae. If this identification is correct the main active ingrediant of *zhu-mkhan* is probably cassic acid.

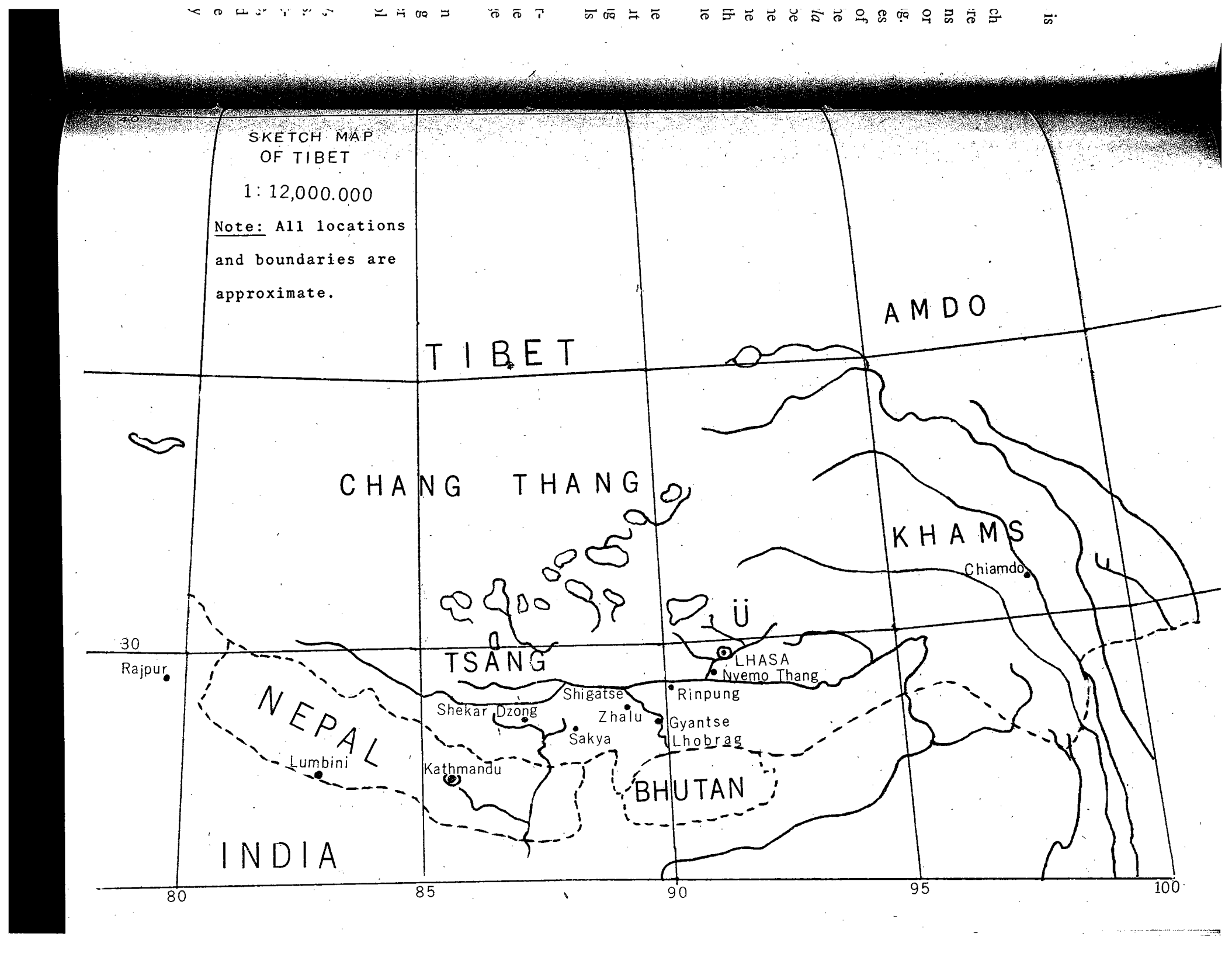
The two mineral salts, soda and borax, were important exports of Tibet which originate from the salty lakes and wastes of the Byang Thang (Northern Plain), where it is said that over the years everything except hair, fingernails, hooves and horns turns into salt. Soda is commonly added to Tibetan butter tea to bring out its color as well as taste, and borax is also important to metal smiths as a flux for soldering. They were also used as mordants in textile dyeing. Most of the secondary dyes were yellow or greenish yellow and were used to brighten and highlight areas of malachite green, such as leaves. The most common of these were derived from the white blossom of a Himalayan wild rose (*se-ba-me-tog*), the petals of the yellow *utpala* (*utpalser-po*) and the root of the *cho-la* plant (*cho'i-rtsa*). The *se-ba* briar seems to be a type of rose, growing as thorny bushes six to eight feet tall in hilly areas. One artist described its flowers as having petals and other parts in fours. After the yellowish-white petals, the source of the dye, fall off, bright red rose-hips ripen with a thick outer flesh. The flower petals are gathered and dried in the shade, and the dye is extracted by soaking in water with a little *zhu-mkhan*.

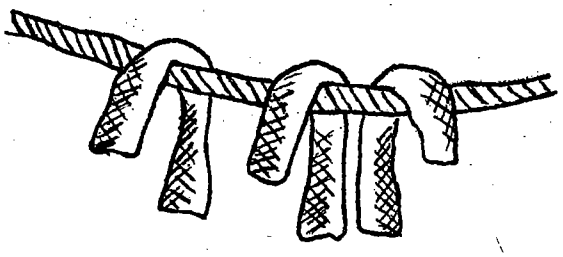
The petals of *utpalser-po* are yellow and it is found blooming in high alpine meadows and grasslands of the Byang Thang. Its fruiting body is light green and about three inches long, and is described in Tibetan pharmacopias as "resembling the musk gland of the male musk deer," (*utpal ser po gla pho'i gla rtsi 'dra*). Its petals are dried and prepared just like the above "rose" petals.

A third yellow dye was extracted from the rest of the *cho-lo* (or *cho-le*) a flowering plant growing in Tibet's high alpine regions. The root was boiled to extract the dye. The root itself has a very sour taste, and is used in ayurvedic medicine. A large amount of it is still carried down from the Himalayas for medicinal purposes.

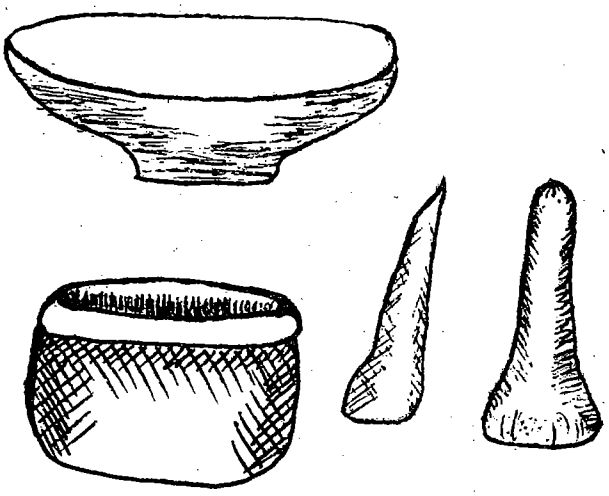
Incidentially, *Zhu-mkhan* itself produces a greenish-yellow dye, but it was known to be less permanent than the above three. A similar dye but, also inferior for painting could be extracted from the inner bark of the walnut tree (*star-ka*). These, together with the reddish brown dye, madder (btsod), are seldom if ever used except in wool and cloth dyeing.

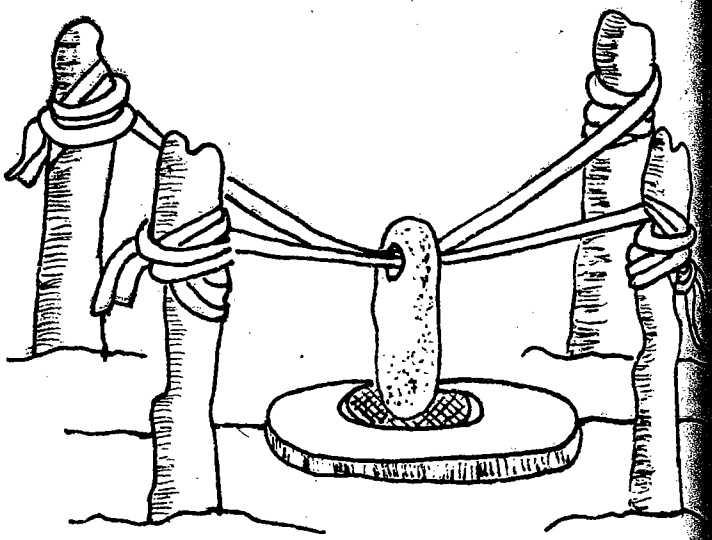
In case one of the important dyes is unavailable, as is somethimes the case today, the artists have to improvise with similar paints derived from the mineral colors. But these have to possess the same characteristics as dyes, since for shading and outlining, a thinner consistency is required. In the case of shading gold, for example, this is obviously so because a thick paint would completely obscure the gold and ruin its effect. Hence, when preparing such substitutes, painters carefully take the upper, more watery, portion of the mineral paint. In this way, most pigments may


SKETCH MAP
OF TIBET
1: 12,000.000
Note: All locations and boundaries are approximate.
TIBET
AMDO
CHANG THANG
KHAMS
Chiamdo
Ü
TSANG
LHASA
Nyemo Thang
Rinpung
Shigatse
Shekar Dzong
Zhalu
Gyantse
Lhobrag
Sakya
Rajpur
NEPAL
Lumbini
Kathmandu
BHUTAN
INDIA
30
80
85
90
95
100



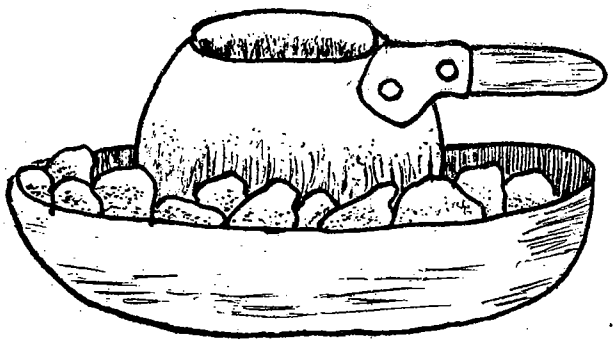
1. GLUE STRIPS DRYING ON ROPE. 2. GZI STONE BURNISHER.

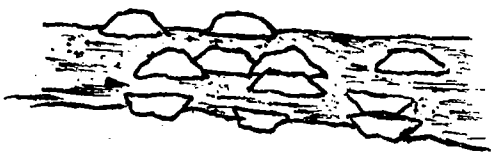




3. CROCKERY MIXING POTS AND WOODEN STIRRERS.

4. PESTLE SUSPENDED ABOVE MORTAR BY ROPES.





5. GLUE REHEATING IN A POT OVER WARM COALS.

6. STICK LAC.

yield a shading pigment, as for example the presently very common substitute for lac-dye, a mixture of thin vermilion and a little ink.

This is not to imply that Tibetan painters are limited to the above coloring agents, although certainly they are the main ones. The Tibetan painter is a resourceful individual, and, for exmple, one artist pointed out to us that a very nice brown pigment can be obtained cheaply and easily from the dregs in the bottom of the brush cleaning jars.

CHARCOAL

One last class of material which should not be omitted from our survey is carbon products, namely charcoal, charcoal dust and lamp black. Charcoal sticks are still used by the more traditional artist for sketching the original compositions of both *thang-ka* and mural paintings (*logs-bris* or *lde-bris*), Charcoal lines could be easily rubbed off and hence both its strength and weakness: any mistakes are easily erased by merely rubbing it lightly, while by the same token any accidental brushing against it might instantly erase much work. To compensate for this, painters when sketching generally work from top to bottom, after first completing the central figure. When the charcoal sketch is completed, indigo is used to again retrace the sketch. If indigo is not available, ink can be used. Any remaining charcoal is then dusted off and there remains a more or less permanent sketch.

Tibetan artists used to make their own charcoal pencils by putting an airtight container packed tightly with willow twigs into a hot fire. Nowadays this has almost disappeared from the painter's worktable in favour of graphite lead pencils. These, of course, give more permanent sketches, but care must be taken to erase all lines which, if drawn with charcoal, would automatically be rubbed off just in course of painting. Many times we have seen the disappointing results where an otherwise fine work has been ruined by the artist's neglect; where he had failed to remove the original pencil line delineating the *thang-ka* vertical axis (*tshangs-thig*), and one could still see the pencil line in the finished painting, visible in the sky, in the main figure's halo, and in the light green for ground. Artists also make use of charcoal dust in another of their main ways of laying down the first outline of the composition, which is essentially a technique of stencilling. The stencil (*btsag-spar*) is made by first drawing a composition on paper and then puncturing all the lines with a series of pin holes. This is held over the painting surface and the design is transferred to it by shaking a powder made of charcoal dust and ochrecous earth through the pin-holes. The red ochre is added to give the mixture weight so that it will be less easily rubbed off or blown away. These designs are then retraced in indigo or ink just as the charcoal sketches were. This is obviously a great time-saver for large projects involving numerous repetitions of a single design, and it has always been used to some extent in *thang-ka* painting.

Ink, some uses of which have already been mentioned, is the last carbon product, being essentially just finely ground black carbon manufactured from lamp black or coniferous wood soot mixed with glue. Tibetans generally obtain it in slabs or sticks from India or China. If none is available, they know the age-old process for producing soot and rendering it into ink.

CONCLUSION

It appears that the Tibetan painting tradition is sinking new roots in Nepal and India, where numbers of Tibetan immigrants have settled in the last two decades. There is every reason to believe that there will continue to be a demand in the Tibetan or other Buddhist communities for the painter's skill. In Tibetan society, when someone dies, one of the main ways to create merit, which is to be dedicated (*bsngo-ba*) for the future welfare of the newly deceased, is to commission a *thang-ka*. Also with the recent boom in monastery construction it is the rare painter who is not yet booked up with orders for many months in advance. Although the painted figures must continue to be drawn around the fixed skeleton of proportions, it is even now almost impossible to find a painter who still uses the traditionally prepared pigments. There is the serious possibility that with this, as with so many aspects of their culture, a superficial resemblance will linger on, while most of the vital roots have long since dried up. This is not entirely the fault of the painters. Not only have most of their original sources disappeared, but also due to communication barriers it is often impossible for them to locate new sources for the old raw materials even if they are available in their new communities. And of course, the commercial paints are all too readily available.

The real hope for the continuance of the tradition lies in the traditional master-apprentice relatonship where a teacher undertakes the prolonged training of promising students, who meanwhile live with the master and assist him. But the present rarity of such apprenticeships is another factor which discourages the use of traditional pigments. In Tibet, a master artist could often rely on his subordinates to prepare the pigments according to his instructions. Now, with the splitting up of this setting, each artist must fend for himself, and many find it too time-consuming to bother with finding, grinding, and mixing the pigments. For these reasons we feel it necessary to record such information while there are still a few artists using these traditional methods and materials.

The number of artists who contributed significantly to this survey are far too many to be mentioned by name. But it would be overly ungrateful not to mention here the names of the three main friends and informants who so freely gave of their time, knowledge and experience.

These are Thargye, from near Sakya now living in Boudha, Nepal; Legdrub Gyatsho from Phenyul in U'now living in Lumbini, Nepal; and Wangdrak from Shekar Dzong now in Rajpur, U.P., India.

* * *

Corrections:

p. 277 – please read "minium" instead of minimum"when reference is made to the mineral pigment made from minium orange (*li khri*).

p. 278 – the correct Tibetan for orpiment orange is "*ba-bla*" not "*ba-blae*"

p. 287 – the reference to "cassia" as a genus of herbs, shrubs, and trees within the family Caesalpiniaceae is incorrect. Here it does not denote any plant of the genus Cassia, but rather is used as the common name for the tree, Cinamomum Tamala, whose three–nerved leaves are also used as a spice.

INDEX OF TERMS

ba-bla	yellow orpiment
bcad	outlining
btsag	red ochre
btsag-smug	dark maroon ochre
btsod	madder
blu-tog	soda
cho'i-rtsa	root used for yellow dye
cog-la	cinnabar
'das-sngon	bluish mud
dkar-rtsi	low grade whitewash
dngul-chu	mercury
dong-ros	realgar
grang-gser	cold-method gilding
gser-rten	foundation for gold
gser-thang	gold *thang-ka*
g. yu-kha	torquoise-colored intermediate between azurite and malachite
gzi	banded onyx used for burnishing
gzhug-rkyong	finishing stage of painting
hang-tshon	technique using only black outlining and thin washes of color
he-rams	inferior grade of indigo used for fabric dyeing
'jug-rkyong	same as *gzhug-rkyong*
ka-rag	calcium white
li-khri	orange minium
logs-bris	mural painting
mdangs	shading
mo-rag	softer variety of *ka-rag*
mo-dkar	same as *mo-rag*
mthing	azurite
mthing-'bru	darkest shade of azurite
mtshal	vermilion
mtshal-rgod	same as *cog-la*
mu-men	lapis lazuli
ngang-pa	yellow ochre
po-rag	harder variety of *ka-rag*
po-dkar	same as *po-rag*

rag-rdul	ground brass imitation gold
rams	indigo
rdo-spang-mthing	general name for azurite and malachite together
rdo-tshon	stone colors
rdo-zho	lime
rdzogs-tshon	technique using first mineral colors over whole painting surface, then shading and outlining with dyes
rgya-mtshal	Chinese or Indian vermillion
rgya-skyegs	lac dye, literary term
rgya-tshos	lac dye
rlon-mdangs	wet shading
sa-dkar	same as *dkar-rtsi*
sa-shag	impurities removed from mineral pigments by washing
sa-tshon	earth colors
se-ba	probably a type of rose, the petals of which are used for yellow dye
se-ba-me-tog	flowers of se-*ba*
shing-tshos	vegetable dyes
sindhura	Sanskrit for minium
skam-mdangs	dry shading
skya-ris	sketching
sngo-sang	second lighest shade of azurite
sngo-si	lighest shade of azurite
so-ris	charcoal sketch
spang	second darkest shade of malachite green
spang-si	lighest shade of malachite green
spang-skya	second lighest shade of malachite green
spang-smug	darkest shade of malachite green
spying	glue
sreg-pa	to dehydrate by heating
star-ka	walnut tree, a source of yellowish dye
thab-kha	oven or kiln
thang-ka	Tibetan icon-scroll
tsha-gser	hot-method gilding
tsha-le	borax
tshangs-thig	central vertical axis of a painting
tshos	dye
tshon-kha-bskang	first step of filling up the painting surface with mineral paints

tshon-chen	same as *rdzogs-tshon*
utpala ser-po	alpine flower, the yellow petals of which are used for dye
zar-ma	sesame
zhu-mkhan	a plant, probably in the genus Cassia used in the preparation of dyes

* * *