Prof. Dr. Henry A. Hänni

Basel (Switzerland)
GemExpert, Consulting

亨利. 漢尼 教授
寶石專家, 顧問公司

Henry A. Hänni, citizen of Basel (Switzerland)
9. Jan. 1945 born in Basel, basic school in Basel

1961 to 1989 Technician at the Institute for Mineralogy at Basel University
1976 Diploma in Gemmology (FGA) London
1968 Maturity exam, start university study of Geology and Mineralogy.
1980 Doctor degree after thesis on beryl from Swiss alpine formations.
1980 gemmologist and scientific staff at SSEF Swiss Gemmological Institute,
1990 Director of SSEF Swiss Gemmological Institute in Basel
1996 Professor for gemmology at Basel University
1998 Member of IMA International Mineralogical Society (Swiss delegate in gemstone section)
2004 AGA Bonanno Award (USA) for Distinction in Gemmology
2006 Teaching professor at University of Lausanne (gemmology)
2007 ICA International Color Gemstone Association, Lifetime Achievment Award for significant contributions to the gemstone industry worldwide.
2009 SGG Swiss Gemmological Society Excellence in Gemmology Award
2009 Gemmological Association of Hong Kong, Honorary Life Membership,
2010 retired as a director from SSEF Laboratory

Founding the firm GemExpert, operating world wide in consulting

Publications
over 150 papers on gemstones and pearls, analytical techniques, detection of gemstone treatments in English, German and French ,numerous talks and education courses in various countries.

亨利. 漢尼 教授
1945 年生於瑞士巴索爾市的漢尼博士，自 1961 年即致力在礦物學領域且於巴塞爾大學擔任研究所技術人員。工作期間陸續完成地質學及礦物學方面的學習，1980 年以 “六柱石在瑞士阿爾卑斯山的形成” 為題取得博士學位。爾後進入瑞士珠寶研究院 SSEF 成為鑑定師和科研技術人員，並自 1990 年擔任院長的一職。1996 年於巴塞爾大學教授寶石學。1998 年成為 IMA 國際礦物學協會成員且為寶石組瑞士代表。2004 年於美國 AGA Bonanno 綬頒 寶石學傑出成就獎，2006 年啟受任瑞士洛桑大學教授(寶石學)，2007 年獲得國際彩寶協會 ICA 終身成就獎及對寶石業之重大貢獻獎。2009 年獲頒瑞士寶石學協會 SGG 卓越獎，同年於香港寶石學協會認可為終身榮譽會員。於 2010 年自 SSEF 實驗室卸任院長職位退休之後，成立寶石專家 顧問公司(Gemexpert)，經營全球寶石諮詢業務，

發表英文、德文和法文 150 餘篇論文，探討寶石和珍珠等寶石處理之偵測技術分析。並於全球各地受邀無數次的演說以及教育課程的開發。

From expectations to reality Prof. Dr. H.A. Hänni, GemExpert
紅寶：從預期到現實 亨利. 漢尼 教授 寶石專家

Abstract

Besides diamond, emerald and sapphire, ruby is one of the most appreciated and most desired gemstones. Over decades ruby has been sought after and only in the last 50 years ruby deposits have extended from earlier a hand full to about 20 productive places. Ancient mining areas posses a high reputation, and their origin lends those stones a premium pricing over deposits of lesser brand awareness. Burma, Sri Lanka, Siam are the top favourites. East Africa (Kenya, Tanzania, Mozambique), Vietnam, Tadjikistan have an inferior ranking, often regardless of the quality of the stones.

As the quality of a mine production has the structure of a pyramid – a few top stones, many medium stones and a majority of low quality stones – treatments were a permanent means to lift the appearance. In the trade we can expect 90% of rubies treated. The expectations of buyers are always high, but the natural beauties have never been enough to supply the demand. The treatments start with hiding fractures by oil or wax filling. Heat treatment at low temperature may shift the colour from violet to purplish red. When temperatures higher than 1200℃ are applied, blue colour portions are completely destroyed. From 1400℃ onwards inclusions of rutile silk can be dissolved, making a turbid stone more transparent. Since about 1980 heating of ruby has been performed with additives (e.g. borax) in order to heal and seal open fractures and fissures. Glassy residues are now kept in the stones, asking for a new terminology for laboratories. The amount of residues makes part of the gemmological description: minor, moderate and significant.

Recently fractured and brittle rubies from East Africa are filled with glass that melts at low temperature. So called lead glass seals fractures and pretends a fine ruby, also because the rutile needles present simulate that the stone has not been heated. Luckily such glass filled fractures contain always small air bubbles, and the lead glass shows a high dispersion, resulting in conspicuous colour flashes.

But also synthetic rubies are found their way into the trade, even as early as 1910 these stones have been increasingly popular. Verneuil boules are comparatively easy to grow, and such stones cost a fracture of a natural counterpart. Their typical internal feature, fine curved bands, makes them easy to detect for a trained gemmologist. From the 1960's on C. Chatham started the production of flux-grown rubies, a new challenge for gemmologists as they are spontaneously crystallised in a melt, and have no curved bands. Followed by other synthesists (Kashan, Ramaura, Knischka) flux grown rubies made the higher quality synthetic rubies, while Verneuil material remained popular and never disappeared because flux grown rubies were always been quite expensive.

To analyse a ruby today is a very difficult and complex matter. In general is not the question of separating the natural from the synthetic, but finding the treatment that has been applied. While fissure healing is comparatively simple to see, low temperature heating may still be a challenge, as rutile inclusions are not affected. But the major difficulty is the detection of origin, finding the brand mark of the ruby. Highest prices are paid for Burma, but Mozambique rubies are much more frequent as this mining area was detected only recently.

摘要：

除了鑽石、翡翠和藍寶石，紅寶是最受推崇和喜愛的寶石之一。在過去的五十年以來，紅寶從早期以幾根手指頭數的出來的產地，數十年來的探尋之路，現在已多達二十處之多的礦源。具有歷史的老礦區名聲打的響亮，這些名牌產地的寶石總是溢價超過其他不知名的產地。緬甸、斯裏蘭卡、泰國是最熱門的，東非(包括肯亞,坦桑尼亞,莫三比克)，越南，塔吉克斯坦常被忽略視為次品而敬陪末座。

一個礦的生產質量像一座金字塔的結構比例，有少數的傑出的石頭位在頂尖，許多寶石位於中間層級，而大部份的產出主要還是屬於較低等級的質量，對於這類材質，處理是優化外觀的慣用手法。在交易市場中我們預計有 90%的處理紅寶，買家總是期望甚高，但天然的美好從來就無法滿足需求的供應；早先的處理方式以浸油或灌蠟來掩飾裂痕，溫度較低的熱處理通常能讓紫色轉變成紫紅色。如果加熱溫度高過 1200℃，藍色調的部份就能完全瓦解，進一步超過 1400℃，金紅石絲狀包裹體會被熔解，也讓原本混濁的外觀變得明澈許多；1980 年後，紅寶的熱處理開始有像是硼砂之類的添加物，主要是為了讓裂縫或裂隙癒合，玻璃狀的殘留物進到了石頭裡面，鑑定單位元元需要新的專有名詞來對應。寶石學中依這些殘留物的量區分描述為：微量、中度和顯著。

最近一些破裂和易碎的東非紅寶石以低溫的工序進行玻璃充填，也就是以鉛玻璃將裂縫封住提升紅寶石的外觀，同時又讓金紅石針狀物保持原狀像是沒有經過熱處理的石頭。還好這種玻充處理通常含有小氣泡，而且鉛玻璃較高的色散會導致易見的閃光。

合成紅寶石仍然在市場上找到一些出路，甚至在 1910 年代早就受到相當的歡迎，維爾納葉法梨晶的合成品不僅較易製成，和天然紅寶的價格更是天壤之別。它們的典型內部特徵，細緻的彎曲弧線讓寶石鑑定師容易偵測出來。1960 年代查塔姆開始生產助熔劑法生長的紅寶石，這種自發在熔體中結晶卻沒有彎曲弧線的新品，對鑑定師而言又是一個新的挑戰。接著發展的助熔劑法合成紅寶石(卡善、拉姆拉、尼希卡)的生產具有更高的水準。不過維爾納葉製成的材料仍然很受歡迎不曾在市場消失，因為助熔劑法生長的合成紅寶成本相當昂貴。

現今要分析紅寶石是相當困難和複雜的事情，區分天然或合成不是件難事，裂隙充填相對也是容易觀察，而然低溫熱處理的方面的偵測仍是項挑戰，由於金紅石包裹體不受影響。然而為紅寶找出產地證明仍是主要的難度，人們願意支付高價來擁有緬甸的寶石，而日前發現的新礦床莫三比克紅寶石卻更是頻頻出現。