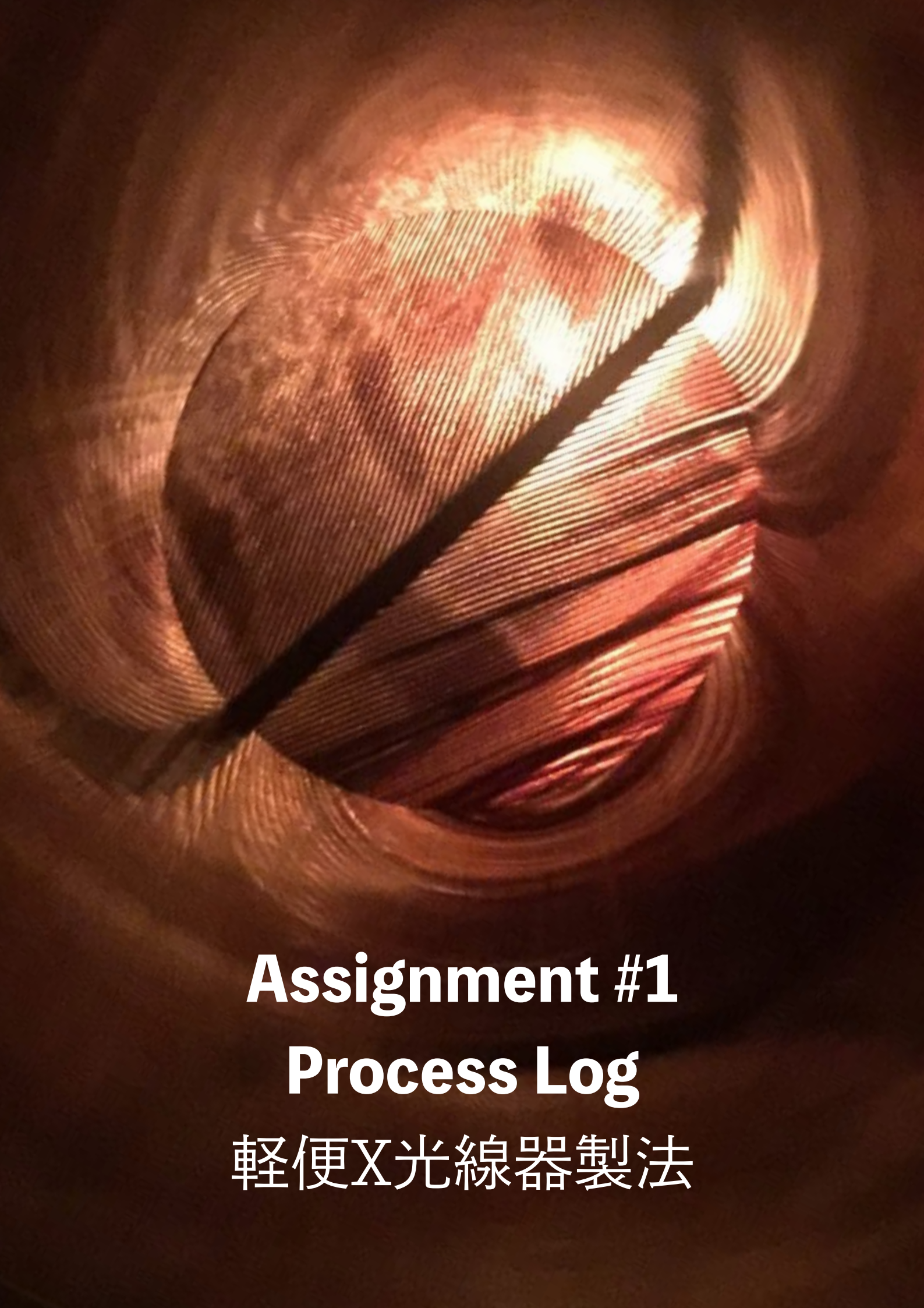

Assignment #1
Process Log
軽便X光線器製法

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(refer to ‘field notes’ document)

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#5 fine-tuning ‘shadow’ production pt. 2

review #2

intro—duction

This recipe is for a 'simple and convenient X-ray tool'. The finished product is a metal tube through which one can supposedly 'see' into one's skin and observe a pseudo-X-ray image of one's hands and bones. This recipe first appeared in the 1912 Japanese publication, 'Big Handbook for Boys and Young Men: A Brocade Bag of Knowledge'.

recipe:

軽便 X 光線器製法

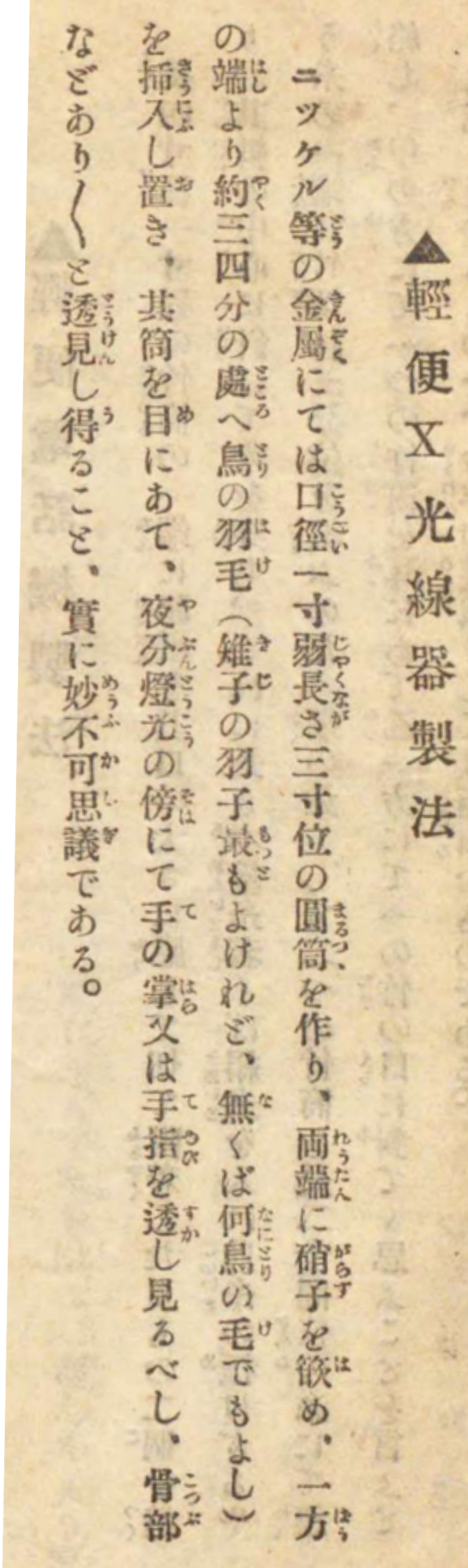
ニッケル等の金属にては口径一寸弱長さ三寸位の円筒を作り、両端に硝子を嵌め、一方の端より約三四分の処へ鳥の羽毛（雉子の羽子最もよけれど、無くば何鳥の毛でもよし）を挿入し置き、其筒を目にあて、夜分灯光の傍にて手のひらまたは手指を透し見るべし、骨部などありありと透見し得ること、実に妙不可思議である。

Taken from *Shōnen seinen daihōten: chishiki kinnō* [Big Handbook for Boys and Young Men: A Brocade Bag of Knowledge]. Osaka: Shōbunkan, 1912: 50.

translation:

Making a simple and convenient X-ray tool:

Using a metal like nickel, make a cylinder with diameter not exceeding one *sun* (~ 3 cm), and an approximate length of three *sun* (~ 9 cm). Fit glass snugly into both ends. About three to four *bun* (~ 0.9-1.2 cm) away from one end of the cylinder, insert a bird feather (the feather of a Japanese pheasant, *kiji*, is most ideal, but if you don't have that, the feather of any bird is fine too) into place. Line the cylinder up to your eye. Standing by the night lamp, you should see your palm and your fingers through the cylinder. It is really incredible to be able to get a clear peek into one's bones.


▲輕便X光線器製法

ニッケル等の金属にては口徑一寸弱長さ三寸位の圓筒を作り、両端に硝子を欲め、一方の端より約三四分の處へ鳥の羽毛（雉子の羽子最もよけれど、無くば何鳥の毛でもよし）を挿入し置き、其筒を目にあて、夜分燈光の傍にて手の掌又は手指を透し見るべし、骨部などありありと透見し得ること、實に妙不可思議である。

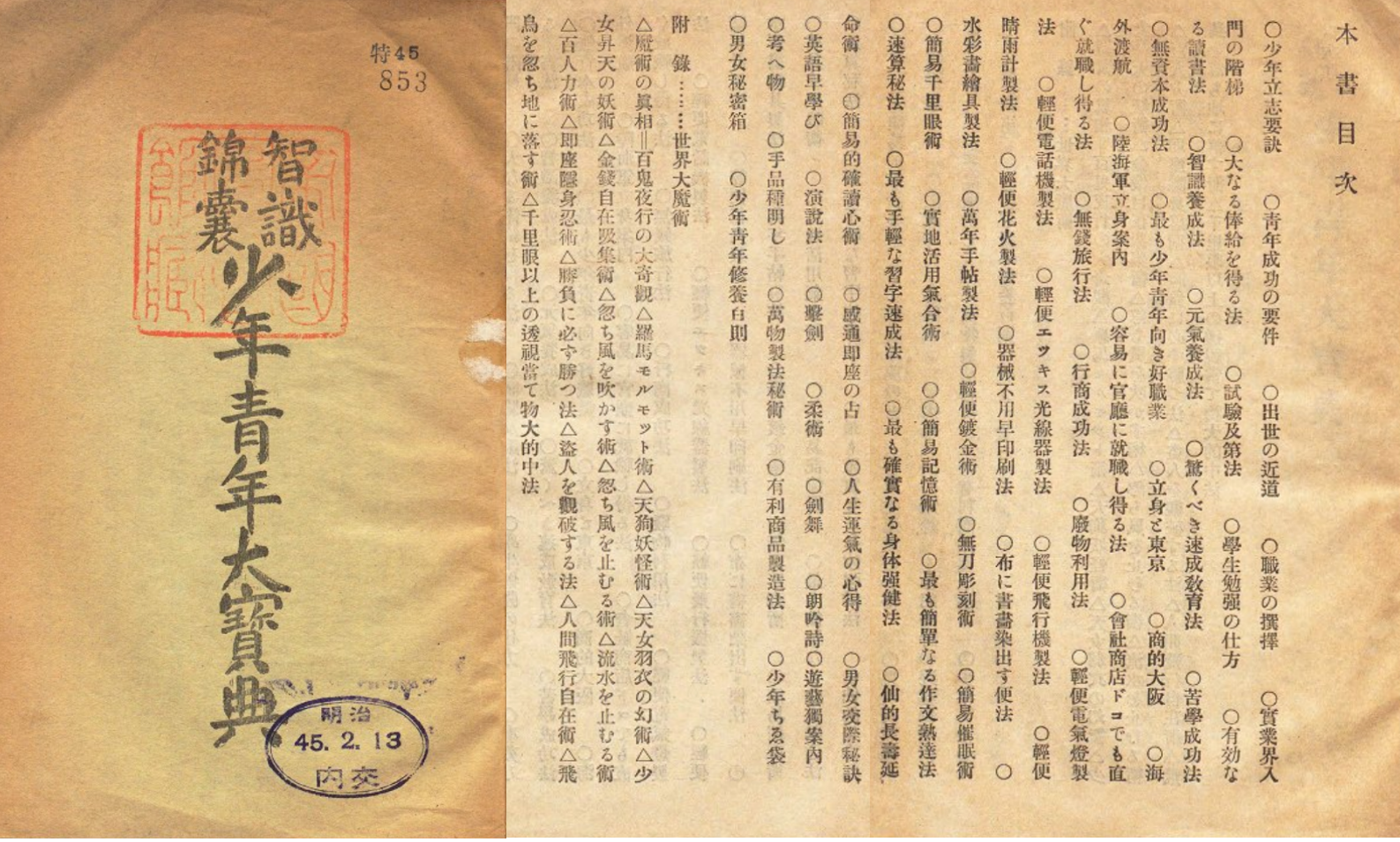
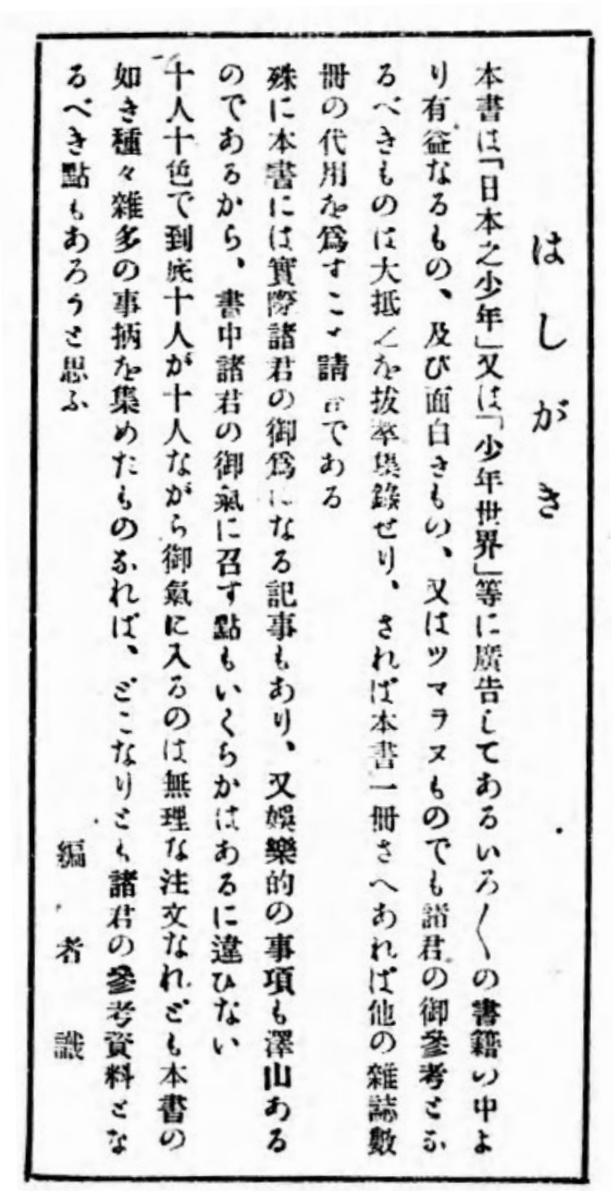


Figure 1. Cover and contents page of *Big Handbook for Boys and Young Men: A Brocade Bag of Knowledge.*

context:

This recipe first appeared in the 1912 publication, *Big Handbook for Boys and Young Men: A Brocade Bag of Knowledge* — a compilation of about 80 short 'know-how'-type entries aimed at 'boys' (*shōnen*, typically referring to those between 7 and 16 years of age) and 'young men' (*seinen*, typically referring to those in their late teens or twenties). These articles cover a broad selection of topics, ranging from schooling (e.g. 'how to pass an exam', 'how to read efficiently'), employment (e.g. 'how to choose a career', 'how to earn a high salary'), travelling (e.g. 'on foreign voyages', 'how to hitchhike'), personal wellness (e.g. 'how to cultivate happiness', 'how to cultivate wisdom'), magic tricks (e.g. an entire appendix titled 'Magic of the World'), to finally, amateur science and crafts (e.g. 'how to make a convenient lamp', 'how to make a convenient phone', 'how to do metal-plating easily', 'how to make simple fireworks') — to which the selected recipe belongs (Fig. 1).

Interestingly, Tokutarō Katsunaga, author of *Big Handbook,* is also author to other guidebook-type publications: *Secret To Being Successful Without Any Capital* (Shobunkan, 1910), *Secret to Money-Making: Unaffected By Recession* (Shōbunkan, 1912), and *Study on Sexuality* (Shōbunkan, 1912). In 1914, the book underwent another round of printing, without any changes made to it, this time by publisher *Hakubundō* in Osaka. A year later in 1915, the institution "Imperial Publishing House for Boys" *(Teikoku shōnen shōin*) significantly edited and reorganised the collection of 'know-hows', and republished it under the new title *The Great Boy Expert: A Treasure House of an Assortment of Practical Knowledge* (Nisshindō). Notably, in this particular edited volume, entries surrounding 'magic' were either removed or shortened. In their place emerged new entires regarding the new Taishō regime (e.g. 'Rituals surrounding enthronement of Taishō emperor', 'Differentiating between the



はしがき

本書は「日本之少年」又は「少年世界」等に廣告してあるいろ〳〵の書籍の中より有益なるもの、及び面白きもの、又はツマラヌものでも諸君の御參考となるべきものは大抵之を拔萃集錄せり、されば本書一冊さへあれば他の雜誌數冊の代用を爲すこと請合である

殊に本書には實際諸君の御爲になる記事もあり、又娛樂的の事項も澤山あるのであるから、書中諸君の御氣に召す點もいくらかはあるに違ひない

十人十色で到底十人が十人ながら御氣に入るのは無理な注文なれども本書の如き種々雜多の事柄を集めたものゝなれば、どこなりとも諸君の參考資料となるべき點もあろうと思ふ

編者識

Figure 2. Foreword to 1915 edited volume *The Great Boy Expert: A Treasure House of an Assortment of Practical*

concept of 'country' and 'national polity'', 'The ideal Taishō-style youth', 'Successful Boys and the Constitution') — which was installed 5 months after the publication of the first edition in 1912. In their preface, editors of the 1915 volume acknowledged the massive boom in publications targeted toward youths (with titles containing 'Japan's Youth', 'Youth World') in the 1910s; yet, they were quick to insist that their volume was more useful and interesting. Containing not just (functional) entries conventionally deemed useful for youths but also pieces for pure entertainment's sake, the volume's strength, editors claimed, lay in its broad yet holistic encyclopaedic content which will definitely speak to the interests of any reader (Fig. 2).

Big Handbook demonstrates the anxieties surrounding figure of the '(male) youth', a highly gendered and politicised social formation that were frequently associated with the lifeblood and future of the Japanese empire in the late 19th and early 20th century. In the introductory entry, author Katsunaga frames the overall volume as a resource for youth readers' continual learning and self-improvement. Amidst an ever-increasingly globally competitive age, boys and young men, he claims, can no longer afford to live in a leisure and carefree manner. He goes on to cite selections from Song-period Neo-Confucian thinker Zhu Xi's *Lines That Crossed My Mind* (*Oucheng*):

少年易老學難成,
一寸光陰不可輕。
未覺池塘春草夢,
階前梧葉已秋聲。

"Do not waste a single moment, young man,
For age is much easier to acquire than learning.
Hardly has the grass by the pond woken up from its spring dream,
when the parasol trees before the steps begin to sing a song of autumn."

lamenting the shortness of life — life that youths must precisely make the most of by continual expanding their self-knowledge.

materials & measurements:

Can we identify all the materials?
Yes. They are a metal sheet/ cylinder, two circular glass pieces, a bird feather, and a source of 'night lighting' (夜分灯光).

Measurements provided in the recipe are in Japanese units of length, *sun* (寸) and *bun* (分).

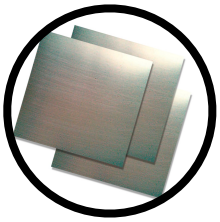
One *sun* is 1000/33 mm (~3 cm), while one *bun* is 100/33mm (~ 3mm).

Are there multiple varieties of ingredients? How to decide which was intended?
Yes. For starters, to build the metal cylinder, the recipe specifically mentions using nickel; yet, it goes on to mention that any kind of metal is fine actually. Similarly, the recipe recommends that one uses a feather from the *kiji*, or Japanese pheasant (today known as *Phasianus versicolor*); yet it goes on to mention that feathers from any bird will do fine too. In these instances, I will try to use the recommended materials; yet if they are unavailable or difficult to obtain, I will make make appropriate substitutions considering the characteristics and intended function of the recommended ingredients (see note #1).

It remains unclear what 'night lighting' refers to; is it a private table lamp or a public street lamp? After all, public gas-powered lamps debuted to Japan in 1872 in port city, Yokohama, and the first gas street lamp in Tokyo appeared in 1874 (See http://www.gasmuseum.jp/English_Information.pdf). 夜分灯光 is not a common expression, and is not featured in the Japan National Language Dictionary (日本国語大辞典). Despite this, it is clear that the X-ray tube is to be used in a dark area or environment wherein there is only one or a few bright light sources, suggesting the necessity of a focused, isolated source of light.

What is the stability of a material over time?
Chemically speaking, all of the materials are relatively inert and stable. Physically speaking, however, they are all manipulatable to a certain extent. The metal sheet is malleable and can be 'beaten' into a cylindrical shape. The feather is soft — not only can its main spine be bent to fit occupy different orientations, the individual finer structures of the feather can also be ruffled to produce different effects. The glass is fragile — not only is it prone to shattering upon encountering strong impact, the smoothness of its surface may also be compromised or intentionally altered if one wishes to 'frost' up the class. This combination of chemical stability and physical manipulability of the materials forecloses much of the possibility of individual materials interacting with one another. They instead invite labour or some kind of physical participation from the human user of these materials (i.e. readers).

Furthermore, although the materials are stable by themselves (i.e., away from human manipulation), that the recipe calls for the finished product to be used under 'night lighting' introduces tremendous variability to the environment under which these materials are supposed to be deployed. Besides 'inviting' the engagement of human users then, these materials — though rarely interacting with one another, also invite interactions with larger conditions like light.



METAL SHEET

GLASS PIECES

BIRD FEATHER

MEASURING UNITS

NIGHT LIGHTING

tools & equipment:

What tools are necessary? How often are tools specified in the recipe?
The recipe does not explicitly mention any tool and equipment, although they are tacitly implied. Beating a metal sheet into cylindrical form, for instance, would require metalworking tools and techniques. The recipe's call for readers to 'fit a glass piece snugly into each of the two ends of the metal cylinder' also assumes that readers would either source for circular glass pieces with dimensions that fit that of the metal tube, or know how to cut glass. Yet, it remains unclear how readers were expected to shape metals sheets or produce a circular glass piece.

Regarding the shaping of metal sheets into cylindrical form, a search in the National Diet Library (NDL) online archives (with search filter limited to time period before 1920) turned up (1) many highly specialised metal-working manuals targeted toward blacksmiths with sophisticated tools and machinery, and (2) many books that discussed the everyday use of metal tubes as sewage pipes, drinking water pipes etc. There was no beginner's guide for metal-working. Given this, it appears that readers were expected to either engage the services of a professional blacksmith OR re-use or purchase metal tubes that were widely used to transport fluids in everyday life.

Regarding the cutting of glass, a search on NDL turned up a short entry on 'how to cut glass easily without diamond' published in a 1896 edited volume titled *The Uses of Physics and Chemistry in Industrial Arts* (http://dl.ndl.go.jp/info:ndljp/pid/854254). Given this, it appears that one usually cut glass either by using a 'diamond' or sharp quartz, or, as per the above-mentioned entry, by running a red hot piece of metal through it.

What are the best ways to replicate the effects of inaccessible tools?
Akin to visiting the blacksmith to help shape a piece of metal sheet into cylindrical form, I could approach metalworking 'experts' and superusers from the Makerspace for help. Alternatively, I could purchase ready made metal tube, though this would require me to cut the metal tube to the specified length using either a hand saw or a power tool. Though a highly-improved and contemporary technique, I could cut (thin) glass by using a diode laser at the Makerspace, or a diamond blade on an electric wet saw (akin to the conventional 'diamond' method). A method

less reliant on 'technology' would be wrapping a string around the area one desired to cut long, and then setting this string coated with acetone on fire, before dunking the glass into cold water. Alternatively, I could purchase ready-made circular glass pieces with dimensions corresponding to the tubes, or replace glass with other transparent but easier-to-cut materials like plastic.

Does the recipe call for purpose-designed equipment or multi-purpose tools?
As mentioned above, the recipe did not explicitly call for the use of specialised equipments or tools. Yet, it appears that tools and equipment like those pertaining to metalworking and glass-cutting — like those listed above, are necessary to deliver certain 'effects' and make possible the execution of certain 'steps' listed in the recipe in the first place.

How do technological changes impact our interpretation/ expectation of the recipes? (e.g., ceramic vs. metal vessels)
I am cautious to speak definitively on whether it was either easier or harder to execute the recipe in the past. For instance, it is unclear if metal or glass was easier to access back then, just as it is unclear if it was easier to access 'experts' with technological expertise back then (e.g. blacksmiths) compared to now (e.g. Superusers of Makerspace). Though I have access to specialised equipment in the Makerspace and can readily purchase raw materials via Amazon from my room today (and the recipe only required few materials), I still found the process to be quite a chore and labor-intensive, and if not for this project, would have read the recipe without actually making it. I wonder how Japanese youths back then responded to this particular recipe — how many of them actually went about making it? As the editors' foreword in the 1915 edition of the volume would suggest, were recipes on 'amateur science and crafts' specifically aimed at youths who were more interested in 'science' and 'making things'? Compared with the cosmetics recipes in Funü zazhi (Ladies' journal) and Nüzi shijie (Women's world) which contain an excess of details and references to the author's own experiences working with the recipe, and which therefore emphasise 'experimentation, sensory know-how, and bodily engagement' (Lean, p. 145), my selected recipe offers few details on the actual process of putting the 'X-ray tube' together, and more details on the general physical characteristics of the individual materials. This led me to think if my selected recipe was really supposed to be 'made' by readers. Or did the recipe, for most readers, function as a kind of heuristic to revisit certain then-dominant scientific ideas and surrounding 'X-ray' and 'X-ray tubes'?

Technological changes since the publication of the edited volume -- like advances in X-ray imaging (and the rise of other more 'advanced', more 'accurate' forms of imaging like MRI) and the availability of clearer and more detailed knowledge about what X-rays are and how X-ray imaging proceeds -- are likely to lead a contemporary reader (like myself) of the recipe to think of the recipe as being nonsensical, overly simplistic, somewhat gimmicky, and clearly doomed to failure. 'There is no way the final product will work', I thought to myself when I first encountered the recipe. Yet, what did it mean for the X-ray tool to 'work'? Did it 'work' because it offered readers a visual experience similar to viewing an X-ray image? But how did an X-ray image look like in the 1910s, when 'X-ray' technology was only first discovered less than 20 years before in 1896? Or did the recipe and X-ray tool also 'work', less because it operated like an actual X-ray imaging device, and more because (1) the recipe contained details that one at that time would commonly associate with 'X-rays', and (2) the process of making the X-ray tool allowed boys and youths who learnt about 'X-rays' in school to experience the concepts and ideas surrounding 'X-rays' more bodily and directly.