dining with Akhenaten, Nefertiti, Meritaten, and 'Ankhesenpaaten. It appears that all Akhenaten’s daughters were born by his Year Nine, since all six appear in the Year Twelve ‘foreign-tribute’ scene in the tomb of Meryrê II,¹ and, if the youngest was old enough to attend public functions by Year Twelve, it would seem likely that they were all born by Year Nine at the latest. This in turn means that 'Ankhesenpaaten was born by Year Six at the latest. If we allow another four or five years for her to be old enough to dine with her parents and grandmother, this would suggest that the dinner took place in Year Ten at the earliest—at any rate, after Year Nine. Even if the iconography of the princesses is unreliable, the dinner must have happened after Year Eight, since the later Aten-name is employed.

If there were no co-regency, and Akhenaten succeeded upon his father’s death, and only then married and started a family (since there is no indication that he had any children before he became king), this would mean that Tiye survived her husband by at least nine years, or else she could not have been depicted dining with her son and his half-grown children. But if she survived him by this length of time, it means that she would have had to be married before she was born! (see Table I).

Table I

<table>
<thead>
<tr>
<th>Akhenaten Year 9–12</th>
<th>Tiye visits Akhenaten, and dies some time within these three years, aged 45/46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akhenaten Year 1</td>
<td>Amenophis III Year 38/39</td>
</tr>
<tr>
<td>Amenophis III Year 1</td>
<td>Tiye aged c. —2—1</td>
</tr>
</tbody>
</table>

Since this is clearly an impossibility, it follows that there must have been an overlap of at least nine years between the two reigns. In fact it is now possible to ascertain the length of the co-regency more closely than this, because Tushratta’s congratulatory letter must now be dated to Year Twelve rather than Year Two, which in turn indicates that the overlap was of between eleven and twelve years’ duration, as postulated by Aldred.² Perhaps the following chronology (Table II) may be suggested:

Table II

<table>
<thead>
<tr>
<th>Amenophis III Year 1</th>
<th>Tiye aged 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenophis III Year 38/39</td>
<td>Tiye aged 44. Akhenaten Year 12</td>
</tr>
</tbody>
</table>

| Tiye dies a year or so later, which closely fits the physical evidence. |

This proof of the co-regency also settles the question of whether or not Nefertiti can be identified with Tadukhipa, the Mitannian princess who married Amenophis III shortly before his death and then married Akhenaten.³ By the time this marriage took place, Akhenaten had been married to Nefertiti for at least eleven years, and had six children by her.  

Juliette Bentley

Reconstruction of a shoulder harp in the British Museum*

The shoulder harp is a member of the arched-harp family. The family trait is a body made of a long arched neck stiffly joined to a resonator box at one end; the strings are attached near the distal ends

1. Ibid. II, pls. xxxvii, xxxviii.  
2. Aldred, op. cit. ch. VII, passim.  
3. E A 23 and 27.

* I wish to acknowledge many stimulating discussions on this subject with Messrs L. Libin, S. Pollens and W. V. Davies, and Drs C. Lilyquist and E. Wintermitz.
of the stick and the box. Depending on the shape of the box one usually distinguishes between shovel-, ladle-, and boat-shaped harps (the shoulder harp is a sub-species of the latter). Iconographic evidence shows arched harps in Egypt from the Fourth Dynasty (c. 2700 BC) up to, at least, Hellenistic times (c. 200 BC). Shoulder harps, however, had an extraordinarily brief vogue; for, as Hickmann put it, ‘they first appeared in Egypt during the reign of Tuthmosis III (c. 1500 BC), quickly became fashionable and vanished from Egyptian musical life already 80–100 years later’. Subsequent history has been kinder to the shoulder harp: the overwhelming majority of the ancient arched harps that survive today are shoulder harps. Mostly, only the wooden structures remain but in the British Museum’s Egyptian collection there is a unique harp (no. 38170) which has much of its ancient skin preserved. The skin with its ‘sound holes’ and hole for the stick is clearly shown in the recent catalogue of musical instruments in the British Museum’s Egyptian collection. However, in another regard the catalogue is in error: the stick is shown pointing away from the skin and, thus, with no contact with the skin. The other shoulder harps in the catalogue have also been reconstructed in the same erroneous manner.

Inspection of harp no. 38170 shows that the stick must have been in close contact with the skin, since there are distinct stretch marks on the skin caused by the pressure of the stick as well as by the strings that once were wound around the stick. With this in mind, we obtain the reconstruction given in pl. XXIII. Here the stick/skin contact agrees with the ancient pictorial evidence on (non-angular) harps. Furthermore, the contact can be justified on acoustic grounds: it transmits the string vibrations in the stick into the skin cover of the resonating box. Since the skin has a larger surface than the strings, it radiates sound more effectively.

The narrow waist in the middle of the resonator box is quite characteristic of the extant shoulder

3 Musikgeschichte, loc. cit.
4 Manniche, op. cit., lists twenty-seven arched harps where the wooden bodies have survived fairly completely, and nineteen of them are shoulder harps. A fair sample of the shoulder harps can be found in the Cairo Museum (well photographed in Hickmann’s Catalogue Général des Antiquités Egyptiennes du Musée du Caire; Instruments de Musique (1949)) and in the Metropolitan Museum of Art in New York (C. Liliquist, private communication). It is apparent that most of the shoulder harps had a total length of between 90 and 140 cm (‘grand pattern’), although a few are 50 cm or less.
5 An angular harp in the Louvre has a well-preserved skin cover, but it is about a millennium younger than the shoulder harp.
6 ‘Stick’ refers to the wooden rod which spans the length of the resonator box and to which the strings are tied. It has variously been referred to as ‘tail piece’ (Wachsmann, see n. 4 overleaf), ‘suspension rod’ (Manniche, op. cit.) and ‘baguette’ (Hickmann, see nn. 1, 2). In the modern concert harp it is called ‘eyelet piece’.
8 Fig. 138–42 in Anderson, op. cit. The cut in the skin at the sides of the body in pl. XXIII is not present in the British Museum harp. The split seemed necessary for the skin used here (calf) but may not be needed for the (undetermined) skin of the British Museum harp.
9 The observation is based on the four harps in Cairo (nos. 69401–2, 69423–4) and two in MMA (nos. 14.10.6, 25.3.306A) which are of the ‘grand pattern’ (see n. 4). (The smaller harp, on the other hand, is not invariably waisted.) The extent of the ‘waisting’ may, perhaps, best be quantified in the following way: first we imagine an instrument with no indentation at the waist, i.e. the sides form a straight line between the ‘shoulder’ of the box where it is joined to the neck and the ‘lip’ at the other end of the box where the rounded bottom starts. At the position of the waist, this imaginary box has a width of WI while the actual instrument has a measured width of WR. The difference (WI—WR) gives a measure of the absolute amount of ‘waisting’, but a better measure is the relative amount (WI—WR)/WI = D. (D varies between 0 when there is no indentation at the waist and 1 when the waist line comes all the way into the middle of the box.) For the six ‘grand pattern’ shoulder harps in the sample \( D = 0.26 \pm 0.07 \) (the error term is the Standard Deviation). For comparison, violins have \( D = 0.55 \) while a Levine Spanish guitar has \( D = 0.26 \).
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harps. It is not immediately clear if the waist was present in the original harps or if the inward bending of the box sides was produced by the skin tension during the subsequent tomb storage. The modern Burmese harp, in many ways similar to the ancient Egyptian shoulder harp, has three rods squeezed between the side walls of the resonator preventing a collapse of the sides. The shoulder harp appears not to have had such supporting rods. A well-preserved but fairly roughly cut shoulder harp in the Metropolitan Museum of Art settles the question. Because of the coarse carving, the wood grain inside the box clearly shows that this harp was originally made with a waist. It seems safe to assume that the waists in all extant shoulder harps were made intentionally. Shoulder harps, then, provide the first example of waisted resonator boxes, a design now mainly associated with the violin family, the guitar, and some Indian instrument groups.

In modern times there are several types of arched harp, perhaps the most conspicuous being the African harp and the Burmese harp. Organologists have remarked on the close similarity between the Ancient Egyptian arched harps and the modern ones and speculated on a possible ancestral relationship. The reconstructed harp of pl. XXIII makes it clear that there is a greater affinity with the Burmese than with the African harp because of the spatial arrangement of the stick and the skin: in African harps the stick is always placed underneath the skin, while in the Burmese harp only the ends of the stick lie under the skin with the central portion (to which the strings are attached) protruding above. Because the stick penetrates the skin in both the Egyptian and the Burmese harps (once in the former, twice in the latter), there are large curvature changes along the skin in both cases. Also, in both cases each end of the stick is attached fairly rigidly to the box: the stick of the Burmese is nailed into the back of the box and clamped with steel wire to the front; the stick of the Egyptian harp is inserted into a slot in the front and tied down with string at the end. The sticks are comparatively robust in both cases—in the extant shoulder harps the sticks seem curiously over-dimensioned. The African harp, on the other hand, has a thin stick that is fairly lightly attached to the sides. Such light construction is possible because some of the string tension is taken up by the skin stretching above the stick.

There is nothing new about the ‘tuning pegs’ at the end of the neck in our reconstruction. As is well known, these pegs were rigidly inserted into the instrument. They could not have functioned in the same way as the rotatable tuning pegs we find in modern instruments (e.g. violins). Most likely the pegs merely acted as supports for the strings which were tied around the neck. If so, how was the harp tuned? In 1948 Hickmann gave an answer that seems to have become accepted: the instrument was tuned through adjustment of the stick elevation, i.e. adjustment of the string that ties the stick to the protruding butt of the resonator box (seen in the foreground of pl. XXIII).

1 M. C. Williamson, Selected Reports (Institute of Ethnomusicology, UCLA), 1 (2) (1968), 46.
4 African harps presumably inspired Wachsmann when he erroneously wrote: ‘The strings (in ancient Egyptian harps) run from the neck to the sound-table where each string pierces the skin...’ in chapter I of A. Baines (ed.), Musical Instruments through the Ages (1961).
5 The joint is not as rigid as in a ‘musical bow’ where the neck and the stick are simply the same piece and the resonator box hangs under this assembly. Hickmann (BIE 35, 320–1) established that the Ancient Egyptians never illustrated their arched harps as a musical bow. Earlier, Sachs (see n. 3) had thought a Fourth Dynasty relief had, in fact, shown a musical bow. Hickmann re-examined the particular relief and drew a different conclusion.
6 M. C. Williamson, private communication (1979).
7 H. Hickmann, ASAE 48 (1948), 639.
8 W. C. Hayes, Scepter of Egypt, 11 (1959), 23.
Tuning of our reconstructed harp clearly shows that Hickmann’s idea is wrong on two grounds: (i) it is impossible, in general, to bring all four strings into tune by the movement of one stick and (ii), even if it were possible to tune the strings by the adjustment of the stick elevation, this would not necessarily occur when the stick makes the proper contact with the skin. (One may, of course, attempt to bring the stick into the proper contact but this would immediately cause the strings to lose their relative tuning.)

After some experimentation on the reconstructed shoulder harp we arrive at a different tuning procedure: (i) the stick elevation is initially adjusted to give a desirable tone; for example, our harp becomes slightly louder if the end of the stick is not in very tight contact with the butt of the resonator box while still being in close contact with the skin; (ii) the strings were then tuned individually by suitable adjustments at the neck. Most probably the tuning mechanism at the neck was the same as on lyres (Egyptian, Greek, African, etc.) and on the Burmese harp: the strings were attached to a collar (made of the string itself or some other material) around the neck of the harp. The collar could be turned to adjust the tension of the string. Friction prevented the string from unwinding.

Bo Lawergren

Chicago, Or. Inst. 8798, 3–4 and Cairo CG 34057, 12–13

(JEA 62, 59, 61–2, pls. XI, XIA)

The incompletely preserved word in the phrase ir wn[n] iḥ-[t]w [ḥr] . . . (lost) . . . ḫprw m mnt nt ti-nṯr r [ grindstone hr nhwt ] [ntwy] (Chicago, Or. Inst. 8798, 3–4) need not have caused problems to E. Brovarski (JE A 62, 59, 61–2). The word in the corresponding version (Cairo CG 34057, 12–13), ir wn[n] iḥw ḫr iḥw bi-i r šms ḫt-ḥr ḫIRT ḫprw m mnt n(t) ti-nṯr r [ grindstone hr nhwt ] [ntwy], was convincingly read and translated by J. Černý (Coptic Studies in Honor of W. E. Crum, 1950, 36–7; cf. also his Coptic Etymological Dictionary, 66, with references to earlier discussions) as kḏf, ‘to gather’, ‘to pick’.

The group in Chicago, Or. Inst. 8798, 4, should then in all probability be restored as [ ḫm ].

Dr Janet H. Johnson, who has been so kind as to examine the relevant part of the text on the original and whom I wish to thank for her help, informs me that, in her opinion, the incompletely preserved tall narrow sign shows a slight widening to the right, thus making the reading kḏf plausible. Furthermore, the ‘sign’ above the break is not as deeply cut as the other hieroglyphs, and is probably just a fortuitous break in the stone.

The translation of the whole passage then runs as follows: ‘if one is transformed [because of] . . . [to assume] the form of a swallow of the God’s Land to gather on [incense-]trees.’ The lexicographical point of interest lies in the fact that the bird could pick on (ḥr) as well as under (ḥr) the incense-trees, a not unnatural image.

Jaromír Málek

The reign-length of Ramesses VII

The chronology of the kings of the middle of the Twentieth Dynasty remains uncertain in detail. Dated royal monuments have only rarely survived, and the dating formulas of contemporary documents regularly omit the royal name. Few dates can be attributed with certainty to the reign

1 M. C. Williamson, Selected Reports (Institute of Ethnomusicology, UCLA), 1 (2) (1968), 46.