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Astronomical Compendium in Hebrew

Catalonia  
c. 1361

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A compendium of astronomical texts, including an illustrated Hebrew translation of Ptolemy's *Almagest*. See Vienna ÖNB Hebr 132 for similar text and illustrations.

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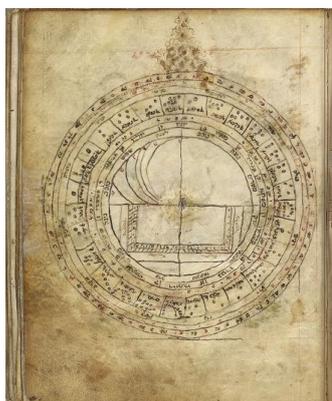
text

- pp. 1-23      Tables of Jacob ben Po<sup>c</sup>el written in 1361 for the latitude of Perpignan (or according to the U Penn catalogue = Treatise on calendar and leap years by Jacob ben David ben Yom Tov **CHECK**)
- pp. 25-60      Abraham ibn Ezra, *Re'shit Hokhmah* (*The Beginning of Wisdom*, cf. Levy and Cantera edn 1939)
- pp. 61-68      Abraham ibn Ezra, *Sefer ha-Mivharim* (*The Book of Elections*)
- pp. 69-76      Abraham ibn Ezra, *Mishpatei ha-Mazalot* (*The Book of the Judgements of Astrological Signs*)
- pp. 77-86      Abraham ibn Ezra, *ha-Mabatim*
- pp. 86-93      Abraham ibn Ezra, *Sefer ha-<sup>c</sup>olam* (*The Book of the World*)  
(for a summary, see Fischer, Kunitzsch, Langermann 2002, pp. 254-58)

pp. 93-94	<i>Sefer ha-Mivharim li-Batlamyus</i> (Hebrew translation of Ptolemy's <i>Book of Elections</i> )
pp.95-102 and 107-08	Tables for converting between Christian and Jewish calendars
pp. 103-06 and 114-15	Tables for the equation of astrological Houses for the latitude of 42° N
pp. 145-46 and 179-82	Tables for the calculation of astrological Houses for the latitude of 43° N
p. 110	A perpetual calendar for the <i>molad</i> .
pp. 116-44	Star catalogue for the year 1391 (see below)
pp. 147-78	<i>Astronomical Tables of Don Pedro</i> (cf. ed. Millás Vallicrosa 1962)
pp. 195-228	Astronomical Tables by Abraham bar Hiyya
pp. 223	List of 28 stars
pp. 226-28	mixture of astrological pieces on lunar mansions and four humours

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### illustrations



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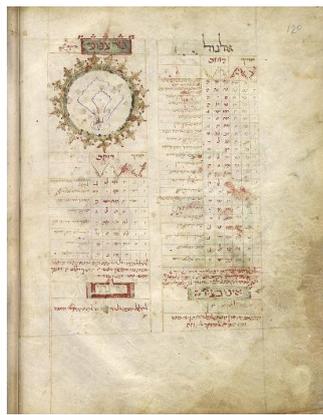
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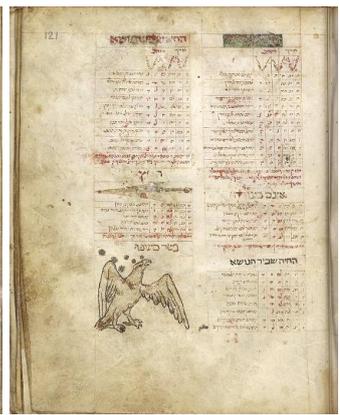
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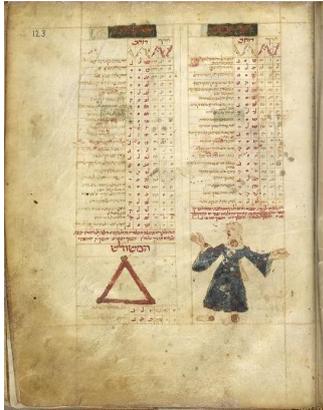
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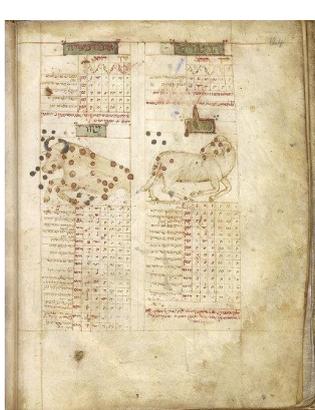
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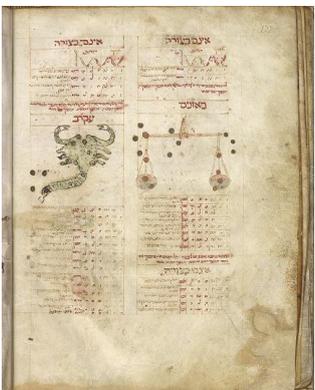
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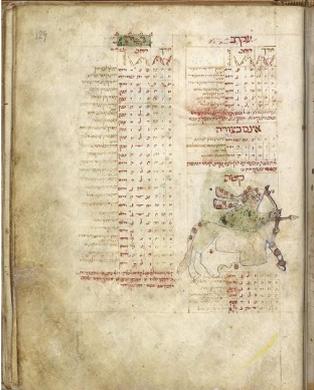
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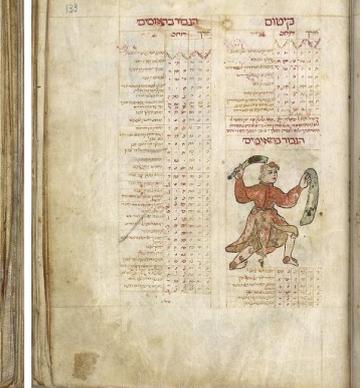
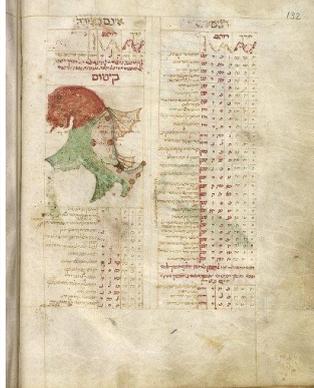
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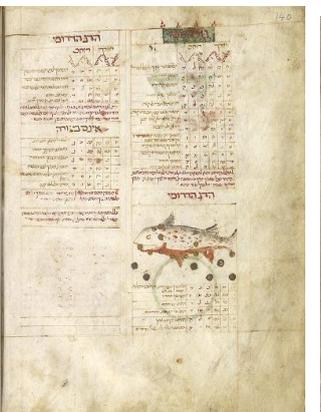
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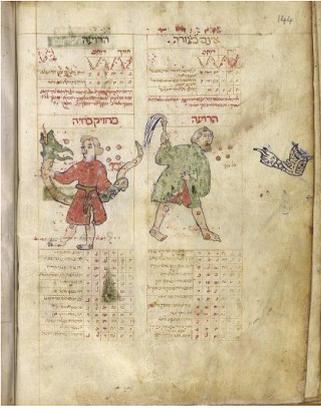
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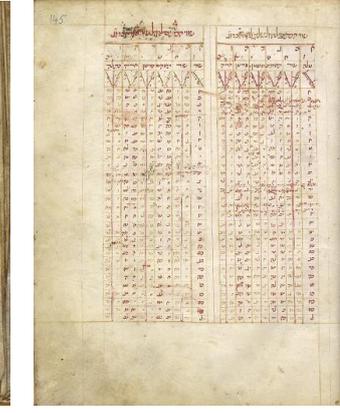
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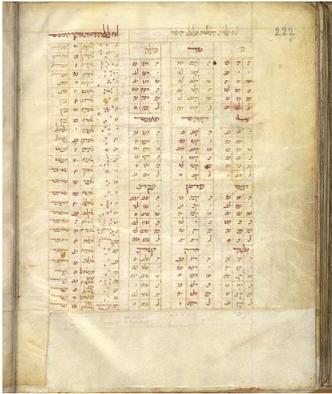


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p. 111 A rough sketch for the back of an astrolabe, with sections for the 28 Lunar Mansions.

p. 112 Drawing of the northern celestial hemisphere. The circle is marked lightly in pencil and divided into 12 equal segments, roughly equating with the 12 zodiacal constellations that form the outer border of the map. The figures are all dressed (with the exception of the GEMINI, and ANDROMEDA is half nude) and all appear to face the viewer, although the map itself is in globe view.

The features of the figures include:

URSA MINOR	short-tailed brown bear, smaller
URSA MAIOR	short-tailed brown bear, larger
DRACO	green snake with two curls in the tail
CEPHEUS	red tunic, stepping to right, right hand raised, left hand touching back of DRACO
BOOTES	green tunic with X-shaped red banding and belt, raises both hands, with stick vertically in left hand
CORONA BOREALIS	shaped like a horse-shoe
HERCULES	blue tunic, tan shoulder strap and belt, kneeling posture, right foot on DRACO's head, curved scimitar in raised right hand
LYRA	small brown bird, difficult to decipher
CYGNUS	large brown bird with wings outstretched
CASSIOPEIA	blue gown, standing to left, left arm wrapped around upright and right hand extended forward

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PERSEUS	pink tunic, green-haired Medusa in lowered right hand, straight sword in raised right hand
AURIGA	blue tunic, with tan X across chest and belt, holds right hands by genitals and holds brown stick with 2 red thongs vertically in his left hand
OPHIUCHUS	stands to left, pink tunic, holds Snake (SERPENS) horizontally behind his back with the head to the left
SAGITTA	(held in the feet of AQUILA, points to the right)
AQUILA	stands to the right with wings stretched out behind him
DELPHINUS	small green fish with pointed snout and fins, towards the right
EQUUS PRIOR	difficult to read, but possibly coming out of the head of AQUARIUS
PEGASUS	white half-horse outlined in blue with red and green decoration in the wings, front legs extended
ANDROMEDA	possibly nude, with short blue wrap around her waist, steps to the left and both hands extended, stands on sword blade of PERSEUS
TRIANGULUM	wider than tall, between hind foot of ANDROMEDA and head of ARIES
ARIES	tan and damaged, possibly sitting with legs tucked under (?) head turns back
TAURUS	half-bull placed along the ecliptic, white with large green curved horns (Arabic style)
GEMINI	two figures walking to the left with arms intertwined
CANCER	heart-shaped shell, green-grey, faces towards LEO
LEO	brown lion leaping to the left, tuft of tail raised  <b><u>note</u></b> : there is a quatrefoil where the 'ivy leaf' or Comes Berenices should be above the tail of LEO
VIRGO	faces to the left, long pink gown, hair exposed, wings opened and decorated in red and blue
LIBRA	pair of Scales held by the mouth of SCORPIO
SCORPIO	green scorpion with a segmented tail, OPHIUCHUS stands on the back
SAGITTARIUS	leaps to the left, red tunic, green turban with ends, blue equine body, holds bow with right hand
CAPRICORN	horse-like goat with green fish tail, front legs extended, damaged

AQUARIUS	stands to the right, long red robe, holds right hand out behind him and raises left hand in front; damaged
PISCES	one fish visible lying along the back of PEGASUS and a bit of stream coming from its tail, damaged

p. 113 Drawing of the southern celestial hemisphere. The circle is marked lightly in pencil and divided into 12 equal segments, roughly equating with the 12 zodiacal constellations that form the outer border of the map. The figures are all dressed (with the exception of the GEMINI) and appear to face the viewer, although the map itself is in globe view.

A fuller description of both hemispheres appears in DEKKER 2012, pp. 459-61.

**note:** this division into 12 parts appears in the hemispheres in Munich clm 14583, Nuremberg Hz 5576 and the Dürer maps of 1515. They also appear in Vienna 5415 (though these hemispheres have all the great circles marked and the Philadelphia manuscript does not).

ARIES	tan, sitting with legs tucked under and head turned back
TAURUS	half-bull placed along the ecliptic, tan with normal-sized green curved horns (less markedly Arabic in style than the northern TAURUS)
GEMINI	two figures walking to the left with arms intertwined, the arms of the following Twin are green
CANCER	heart-shaped shell, faces towards LEO and highly decorated shell in red and green zig-zags
LEO	brown lion leaping to the left, tuft of tail raised
VIRGO	faces to the right, long pink gown, hair exposed, wings are rather stringy and green
LIBRA	pair of Scales held by the mouth of SCORPIO
SCORPIO	green scorpion with a segmented tail, OPHIUCHUS stands on the back
SAGITTARIUS	leaps to the left, red tunic, green turban with ends, blue equine body, holds bow with right hand
CAPRICORN	horse-like goat with green fish tail set with a twist in it, front legs extended, damaged

AQUARIUS	stands to the right, long red robe, holds right hand out behind him and raises left hand in front and holds the end of a stream that runs beneath his feet and feeds into the mouth of PISCIS AUSTRINUS
PISCES	the M-shaped stream is visible, but both fish are mere shadows
CETUS	is difficult to read, but appears to be a monster with a green horse's head and two green scaly arms, looking as though it is wearing a red polo neck that extends in a bulbous shape as far as the tail before the tail fin, the tail fin is tan and blue
ORION	stands to the left, in short red tunic, right hand touches the knees of TAURUS and left hand is raised to hold a stick vertically that runs along the following (right) leg of the following (right) Twin
ERIDANUS	a green river that runs from ORION's right toe to the breast of CETUS and then out again under the front feet of CETUS (shaped a bit like a lambda)
LEPUS	small brown rabbit crouch with its nose touching ORION's heel
CANIS MAIOR	large brown dog placed vertically along the solstitial colure, with tongue out and, possibly, with flames above his head
CANIS MINOR	a small white dog with brown spots standing behind CANIS MAIOR. its nose touches the edge of the zodiac band
NAVIS	possibly half a wooden ship, with the stern on the left and the cut-off on the right, blue sails are tied to the main mast, there is a crow's nest and two steering oars at the stern
HYDRA	a long green snake with a dragon's head, tongue sticking out, with two curls in the tail
CRATER	a chalice with a red base and red inner cup, on the back of HYDRA
CORVUS	a tan bird facing to the left, with wings stretched out behind it and pecking at the body of HYDRA
CENTAURUS	centaur with ink equine half and nude human half, holds a thyrsus in his right hand in front of his chest, holds BESTIA (a spotted panther) by the back heels in front of him, the centaur has to bend slightly to fit under the length of HYDRA's tail
ARA	large amount of red flame coming from a small green urn
CORONA AUSTRALIS	a crown seen in side view beneath the front legs of SAGITTARIUS
PISCIS AUSTRINUS	fish with tan top and green belly, facing to the left with the stream of AQUARIUS in his mouth

pp. 116-44 An illustrated star catalogue for the year 1391, with a set of very fine, full colour drawings of the 48 Ptolemaic constellations set within the columns of the tables. Each constellation is marked by circular silvery-gold stars, usually outlined in red and varying in size to show the magnitude. The quires have been incorrectly arranged so that after CORONA BOREALIS on p. 120, the text jumps to AQUILA . The constellations of HERCULES, LYRA, CYGNUS, CASSIOPEIA, PERSEUS, AURIGA, OPHIUCHUS and SERPENS appear on pp. 141-44.

During its history, the stellar table section of the manuscript appears to have sustained some water damage toward the bottom of the page near the spine, so that several of the constellation pictures have become washed out. This has been 'remedied' by a later hand rather crudely tracing the contours of the figures and many of the stars in blue ink.

I have only seen the digital reproductions of this manuscript, from which it is relatively difficult to count the stars as a number of the images have been badly abraded or washed away. When the stars can be counted, however, they are usually very close to the numbers and locations listed in the Latin Stellar Tables (Gerard of Cremona translation, ed. Kunitzsch 1990).

p. 117 **URSA MINOR** (labelled in black) is tan and walks to the left. It has a snub nose, rounded ears, rather large furry feet and a medium-length tail. It has 1 at the end of the tail, 1 in the middle of the tail, 1 at the beginning of the tail, and rectangle of 4 stars on the body, or 6 stars in all. There is a brown mark beyond the end of the tail, but it does not appear to be a star.

**URSA MAIOR** (labelled in a red block) is tan and walks to the right. It is a larger bear with similar features. It has a number of stars, including 1 on the snout, 1 on each eye, 2 along the back, 2 in the body and 1 on the stomach, 1 on the flank, 2 at the beginning of the tail, 1 at the end of the tail, 2 above the rump and a circlet of 5 stars beneath the front right foot.

p. 118 **DRACO** is a long snake placed vertically on the page with a dragon's head bearing pointed ears and a pointed snout. The upper (back) surface of DRACO is green and the belly is

white. Its mouth is open and it has a long red forked tongue sticking out. There are two curls in the length of the body. There are a number of gold stars in its body, including 1 on the tongue, 1 on the snout, 1 on the jaw, and several running down the length of the body).

p. 119 **CEPHEUS** (labelled in red) walks to the right and faces the viewer with his arms and legs bent. He wears a conical hat with a dark red brim and has a forked beard. He is dressed in a loose red tunic, belted at the waist with a tan belt and wide skirt that falls to below his knees. His left arm is carried in front of his with an open palm facing the viewer and he carries his right arm to that its clenched fist rests at his right hip. He may be carrying something in that hand. His feet are bare. He has numerous stars (including 3 stars placed vertically on his cap and 1 on either side of it)

**BOOTES** (labelled in red) is a male figure facing the viewer, who stands to the right, holding a spear vertically in his right hand and the left palm facing upwards in front of him. He has a small cap on his head and large puffs of blonde hair. He is in a knee-length green tunic with bell sleeves, which have red interiors. He wears a decorated tan belt at his waist and a straight sword with a red blade hangs from his right hip. He is wearing tan boots (is barefoot?) and is covered with stars (including 1 on the head, 4 in the left hand, 1 on the shaft of the spear and 1 large star between the legs)

p. 120 **CORONA BOREALIS** (labelled in red within a green cartouche) is a golden wreath/crown with 18 leaf-shaped protrusions and an inner band of green. Inside the circlet, there is a violet ink drawing of a decorative plant-like form. It is marked with 8 red stars.

There is a mis-pagination here, so the content jumps from CORONA BOREALIS to SAGITTA (HERCULES, LYRA, CYGNUS, CASSIOPEIA, PERSEUS, AURIGA, and OPHIUCHUS appear on pp. 141-44. There is no individual SERPENS.)

p. 121 **SAGITTA** (labelled in red) is a lightly-coloured arrow-head pointing to the left with 1 star in the tip, 1 in each point of the arrow and 1 in the shaft, or 4 stars in all

**AQUILA** (labelled in gold) stands facing to the right, facing the viewer, with his left wing extended in front of him and his right wing held close to the body. The visible stars include 1 in the head, 1 in the chest, 1 in the right shoulder and 1 in the tail, as well as 3 above the head and 3 above the right wing.

p. 122 **DELPHINUS** (labelled in gold) is a large blue fish that swims to the right. It has an open red mouth. It has 3 gold stars circled in red in the tail, 3 along the back and 4 along the belly, or 10 stars in all.

**EQUUS PRIOR** (labelled in gold) is a russet-coloured horses head and neck facing to the right. The four stars are difficult to see in the reproductions, except for 1 star on the nose (mouth).

**PEGASUS** (labelled in gold) is half a horse that faces to the right with its front legs extended. The wings are held upright and the cut-off appears to be straight. Amongst the stars, one can see 1 star in the neck, 1 in the mane, 1 star above the neck, 5 large stars scattered across the two wings, 1 star at the cut-off, 2 stars in the chest, 1 in the left leg and 1 in the left hoof and 2 on the right leg and 1 on the right hoof.

p. 123 **ANDROMEDA** (labelled in red) stands facing the viewer, slightly to the left, with her hands outstretched at shoulder height. She walks to the left. She is dressed in a loose blue tunic with bell sleeves and a loose U-shaped neck. Her hair is blonde and falls to below her waist. Amongst the stars, there is 1 large star in her neck (between her shoulder blades), 1 on each shoulder, 3 on the right arm, 1 on the right hand, 1 on the upper left arm, 1 on the left elbow, 1 on the bell sleeve, 2 or 3 stars about the waist, 6 (?) on the skirt, and 1 star on each heel.

**TRIANGULUM** (labelled in red) is a red triangle with a gold star in each corner, or 3 stars in all.

p. 124 **ARIES** (labelled in gold against a red-framed green cartouche) is a white ram with his feet bent under him. The body faces to the right and the head turns back towards the left. He has a very long tail and short curved horns. The stars include: 1 in each horn, 1 in the snout, 1 on the eye and 1 on the cheek, 1 on the neck, 1

on the back, 3 in the tail, 1 on the flank, 1 on the haunch, 1 on the right hind leg. There are also 5 silver stars outside the form.

**TAURUS** (labelled in gold within a green cartouche) is half a bull facing to the right. He is tan in colour and has short, curved grey horns. His cut-off has a circular notch in it (see Arabic parallels) and both forefeet are slightly bent, but extend forward. The stars marked include 4 along the back, 3 stars on the hump, 4 stars on the flank, 2 stars in the neck, 1 on each shoulder, 1 on each knee, 1 star on the left front hoof, 5 stars in the face, 5 stars in the horns and 8 silver stars in front of the head and, possibly, 3 silver stars below the belly (or these are bleed-through from Andromeda's stars on the previous page).

p. 125 **GEMINI** (labelled in red) are two nude youths, facing the viewer and walking to the right. Their arms are outstretched from their shoulders and the inner arms cross each other's body. The leading (right) Twin has 1 star in the head, 1 star on the neck, 1 on each shoulder, 1 in the left elbow, 1 star in the left wrist, 1 star on the back, 1 star on the left elbow, 1 star in the right knee, 1 star in the right ankle, 1 star below the right foot, and 1 star in the left calf. The following Twin has 1 star on the head, 1 star on the right shoulder, 1 star on the rump, 1 star on the left knee and 1 star on each foot. Outside the form, there are 4 stars near the leading Twin's right hand, 1 star between their bodies, and 1 star in front of the leading Twin's right knee and 1 star in front of his right foot.

p. 126 **CANCER** (labelled in gold) has a red body that faces to the top of the page. There are two large claws, which meet at the Crab's nose, and three legs on each side. The stars are difficult to see from reproductions, but there is 1 star in front of the nose, 1 star by each large claw, 1 star above the right claw and at least 4 stars on the body.

**LEO** (labelled in gold) is a tan lion that leaps to the right, his mouth is red and both forefeet are raised. The end of his tail is held high and the tuft at the end is very large. Amongst the visible stars, there are 6 or 7 stars in the head, 1 star on the back, 1 on the haunch, 3 stars on the torso, 1 star on the right foreleg, 3 stars along the belly, 2 on the right hind leg, 1 large star in the tuft of the tail. There are 3 stars in a vertical line below the belly, 2 stars above the shoulder and 3 stars above the tail.

- p. 127 **VIRGO** (labelled in gold within a green cartouche) stands facing the viewer, slightly to the right. She is dressed in an orange-red loose robe with bell sleeves, the inner lining of which is green. Her wings are outstretched. She holds what looks like a sword, but is probably a plant on her right hand in front of her chest and her left hand is held palm forward down by her side. The image has been very badly abraded (or water damage?) and appears to have been outlined more recently and rather clumsily in dark blue pencil. Of the stars, there are 5 stars in her face, 1 on the shoulder of each wing, 2 or 3 stars in her right wing, several (8?) on her skirt, 1 star on her left hand and 1 on each foot. There are also 6 stars outside her left wing.
- p. 128 **LIBRA** (labelled in red) is a pair of Scales with blue pans and red interiors of the pan. There are 2 stars in the left pan, 3 stars in the right pan, 1 star on each set of ropes and 1 star at the end of the left beam, or 8 stars in all. There are also 9 silver stars outside the form.
- SCORPIO** (labelled in red) is green with its back to the viewer. It has a heart-shaped thorax and two curved front arms that end in white claws. There are three fat legs on either side, and the tail looks like a segmented worm, possibly with a forked sting at the end. There are 3 stars in the face, 1 or 2 on the shell, two in the smaller left legs and 2 stars in the smaller right legs, and 6 stars running down the length of the tail and 1 large star at the end. Outside the tail, there are 3 silver stars forming a quadrilateral with the large star at the end of the tail.
- p. 129 **SAGITTARIUS** (labelled in red) leaps to the right. The figure is badly (water?) damaged, so the outline has been poorly drawn in dark blue pencil. From these tracing, one can determine that the man holds his bow with his left hand and has a scarf tied around his head with two fluttering ends. His shirt is green. The stars include 3 stars in the head, 6 stars in the fluttering ends of the scarf, 3 stars in the bow, 3 stars on the extended front leg, 1 star on the human back, 3 stars on the tail, 1 star on the groin and 1 star below the belly.
- p. 130 **CAPRICORN** (labelled in gold within a blue-grey cartouche) faces to the right and is blue-grey in colour. Its front legs are bent and extended. The goat's head has a beard and long, slightly curved tan horns. The tail has one large curl and ends in a

fork that points upwards. Amongst the stars, there is 1 star in the leading horn, 2 stars in the following horn, 7 stars in the face, 2 stars in the neck, 2 stars in the chest, 1 star in each knee, 5 stars in the mid-section, 4 stars running down the back and 3 stars at the end of the tail.

**AQUARIUS** (labelled in gold within a blue-grey cartouche) stands facing the viewer and slightly to the left. It has suffered (water?) damage and is overdrawn in blue pencil. The figure appears to be female with long tan hair and dressed in a long, loose green gown with bell sleeves. She has a red mantle (?) behind her and her feet are bare. She stands on a stream that flows from a large upside-down tan urn, placed near her head, which she holds (?) in the outstretched right hand. The urn is decorated with arabesques and the water is blue-grey. Amongst her stars, she has 1 star in each shoulder, 3 stars on her chest, 1 star in each elbow, 8 or 10 stars in her skirt, 1 star on her left knee and 1 star in her right hand. There are 18 stars in the water and mingled around her feet. Outside the form, there are 3 stars behind her back and 3 stars in front of the bend in the stream.

- p. 131 **PISCES** (labelled in gold within a blue-grey cartouche) are green and both swim the the left, forming an angle of about 45° with their bodies. Their tails are connected by an M-shaped blue stream. There are 10 or 11 stars in the top fish, 13 in the bottom fish and 9 stars in the stream. There are 4 stars next to the tail of the upper fish.
- p. 132 **CETUS** (labelled in red) is depicted as 'leo marinus' vertically on the page. It has a red lion's head and neck with its tongue sticking out. The rest of the body is a green fish with four sets of bat-winglike fins and a scalloped tail. Amongst the stars, there are 7 (?) in the face, 4 or 5 stars in the neck, 4 stars in the fish body and 3 stars on the tail.
- p. 133 **ORION** (labelled in red) faces the viewer and lunges to the right. It has been outlined in blue by a later hand. He wears a red loose tunic with three buttons down the chest and a gold band at the neck and around the waist. The sleeves are full, but caught at the wrists. The skirt is long with two openings that furk back to reveal a tan lining. He is barefoot and the following (right?) leg is badly twisted. He holds a curve of blue (water) upraised in his leading left hand and has a curved sword in his right hand, held above his head. Amongst the stars, there is

1 star in the head, 1 on each shoulder 1 star in the left breast, 2 stars above the belt and two below the belt, 2 or 3 stars in the skirt, 1 star in each knee, 1 star in each foot 2 stars on the right elbow and 1 star in the right hand.

p. 134 **ERIDANUS** (labelled in gold) is an S-shaped segment of a blue and grey stream, the bottom left ending in a fork. There are 34 stars on it.

**LEPUS** (labelled in gold) is a small grey rabbit leaping to the right. There are 2 stars in each ear, 1 star on the jaw, 1 star on the left front foot, 2 stars in the chest, 1 star on the haunch, 1 star in the groin 1 star at the end of the tail and 1 star between the two back feet, or 12 stars in all.

p. 135 **CANIS MAIOR** (labelled in gold) is a white, blunt-nosed hound that stands on its hind feet in profile to the right. It has a red tongue sticking out and a long thin tail. There is 1 star in the tongue, 3 stars in the head, 1 star in the neck, 1 star in the chest, 2 stars in the left front leg, 2 stars in the right front leg, 2 or 3 stars in the shoulder, 1 star on the back, 1 star in the belly, 1 star on the groin, 2 stars on the left hind leg, 1 star at the base of the tail and two stars on the right hind foot, or around 18 stars in all.

**CANIS MINOR** (labelled in red) is a sharp-nosed white dog with long pointed ears that are held flat against its head. It faces to the left and has a red tongue sticking out. It has a long thin tail that is held upright. There is 1 star in the chest and 1 star in the flank.

p. 136 **NAVIS** (labelled in red) is a full wooden ship that sails to the right. The main sail expands to the right with the wind and there are ropes running down each side. There is a green pennant blowing from the raised bow (?) to the right. The bow has a foliate decoration like a figurehead on the front beam. There is a stern mast with a triangular sail and a rope hanging from it. There appears to be a square rudder below the stern and there is an oblong shape near the bow that might be an oar. The ship is set in green and grey water. The whole is outlined with blue ink. Amongst the stars, there are 10 in the bow, 7 stars near the front oars, 13 stars on the stern, 2 star in the mast, 1 star in the crow's nest and and 3 stars on the main sail, 2 star in the rear sail and 1 star at the top of the mast, or about 39 stars.

**HYDRA** (labelled in red) is a long snake with a green back and a tan belly that slides to the right. It has a bright red dragon's head with pointed ears and an open mouth. There is one curl in the middle of the body. There are 5 stars in the face and at least 17 stars down the length of the body. There are also two stars above the head.

p. 137 **CRATER** (labelled in red) is a large urn with a circular body and a flared neck and foot. The vase is heavily decorated in gold. There are 6 stars on the body and 1 star in the neck of the vase, or 7 stars in all.

**CORVUS** (labelled in red) is tan-coloured and stands to the right with its wings held open behind its back, It raises its head and one of its legs. It is outlined in blue. In its present state, only 4 stars are visible: 1 in the beak, 1 in the chest, 1 in the wings and one on the lifted foot.

p. 138 **CENTAURUS** (labelled in gold) is placed vertically on the page so that its hind quarters are at the bottom. He has a red shirt and holds a straight stick in his left hand. In his right hand, he holds the hind foot of a large lion (**BESTIA**) that is tan with red lines in the mane. The Centaur raises his front leg. The whole is outlined in blue. The visible stars include 3 stars in the head, 4 stars in the club, 8 in the blouse 3 along the equine back, 4 stars on the flank, 1 in each hind knee and 1 star in each hind foot, 1 star in each front knee and 1 in each front hoof. The **BESTIA** has 19 stars in it.

p. 139 **ARA** (labelled in red) is a highly-decorated, hourglass-shaped incense burner, coloured in red, yellow, blue and red. It has flames coming from the top,]. There are 4 stars in the flames, 1 on the middle band and 1 on each of the two legs, or 7 stars in all.

**CORONA AUSTRALIS** (labelled in red) is a wreathlike circlet with 14 floreat points coming from it. It has a green interior and a yellow exterior. There seem to be around 13 stars in all.

p. 140 **PISCIS AUSTRINUS** (labelled in red) is a large fish with a grey back and a red belly that swims to the left. It has 4 stars on the flank, 7 stars along its belly and 6 stars below the body.

p. 141 **HERCULES** (labelled in red) stands facing the viewer with slightly bent knees as if walking to the right. He has a knee-length red tunic that is caught at the waist and has loose  $\frac{3}{4}$  length sleeves. He is barefoot and bearded. He holds his left hand in front of him with the elbow bent. He raises his right hand behind his head and holds a golden scimitar in it. The whole is outlined with blue. Of the visible stars, there is 1 star in the head, 1 star on each shoulder, 1 star on each upper arm, 1 star on each elbow, 3 stars in the left hand, 5 stars at the belt, 2 stars in the fold of fabric that extends from his belt, 3 stars in the left thigh, 2 or 3 stars in the left knee, 3 stars in the lading left foot, 1 star in the right knee, 1 star in the right calf, 1 or 2 stars in the right foot and 1 star in the handle of the scimitar, or around 30 stars.

**LYRA** (labelled in red) is a tan-coloured bird, with its head at the bottom of the page and its wings held close to its body as if it were falling or stooping. It is outlined in blue and the position and number of the stars (with the exception of 1 star in the head) is difficult to determine.

p. 142 **CYGNUS** (labelled in gold) is a brownish rooster with its wings and legs outstretched as if in a heraldic posture. Its head faces to the left and it has a red comb and wattle. It is outlined in blue. The visible stars include 1 above the beak, 1 on the back of the head, 2 stars in the body, 4 in the right wing and 1 (?) in the left wing, 1 in each leg and 1 on each foot 1 star in the tail, or more than 14 stars there are also 2 stars beneath the left wing.

**CASSIOPEIA** (labelled in gold in a blue cartouche) sits in a green throne facing the viewer and slight to the right. She wears a reddish long gown with a scoop neck and bell sleeves. Her hair is long, blonde and uncovered, her right foot peeks out beneath the hem of her dress. She holds her hands out to the side with slightly bent elbows and the palms held forward. The seat has two pinnacles at the back and she appears to be holding a palm-treelike sceptre vertically in her right hand. The whole is outlined in blue and the stars are difficult to see, except for 1 star at her neckline.

p. 143 **PERSEUS** (labelled in red within a green cartouche) stands facing the viewer and leaning to the right. He has a knee-length red tunic that is split in its skirt to reveal a green interior. He holds an object that has lost all its features in his left hand in front of him. In his right hand, he raises a notched sword (*harpe*) above his head. He has a tan cap with a white head covering under it. He appears to be barefoot. The whole is outlined in blue. Amongst the stars, there 1 or 2 on the right shoulder, 1 on the left breast, 3 stars at the waist, 4 stars on the right thigh 1 star in the left thigh, 1 star on each knee, 1 star beneath the hem of the skirt between the legs and 3 stars on the left foot.

p. 144 **AURIGA** (labelled in red) stands to the left, facing the viewer. He is positioned with his left hand held on his stomach/waist as if bowing forward. He has a loose knee-length tunic with full sleeves. The shirt is slightly opened beneath the waist to reveal a red interior. He is barefoot and bearded and his mouth is open. He raises his right hand to shoulder height and holds a many-thonged flail in it. The figure is outlined in blue. (In the right margin there is a highly stylised/decorated arm pointing to this figure.) Amongst the stars, there is 1 star on his head, 1 on each knee and 1 on each foot. There is also a quadrilateral of 4 stars in front of his face.

**OPHIUCHUS** (labelled in red) stands to the left, facing the viewer. He has short blonde hair and wears a loose, knee-length tunic that is held by a golden belt at the waist. He is barefoot and holds SERPENS behind his back. SERPENS has a dragons face on the left side and a twist in its tail on the right. It has no legs and has a green face and a tan belly. Both figures are outlined in blue. Amongst the visible stars, the man has 1 in each knee and 2 stars in each foot. The SERPENS has 4 or 5 stars in its head at at least 8 down the length of its body. There is a quadrilateral of 4 stars behind the head of the man.

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**notes**

There is a discussion of the contents in Fischer, Kunitzsch, Langermann 1988/2002, pp. 254-58, but note discrepancies between this article and the U Penn website notes below.

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**bibliography**

D.S. Sassoon, *Ohel Dawid*, London 1932, II, pp. 1041-43.

*A Further Ninety-Seven Highly Important Hebrew Manuscripts from the collection formed by the Late David Solomon Sassoon*, Sotheby's New York, 4 December 1984, lot 88.

Karl A.F. FISCHER, Paul KUNITZSCH and Y. Tzvi LANGERMANN 'The Hebrew Astronomical Codex Ms. Sassoon 823', *The Jewish Quarterly Review*, NS LXXVIII, 1988, pp. 253-92; reprinted in Y.T. LANGERMANN, *The Jews and the Sciences in the Middle Ages*, Aldershot 2002, chapter 10.

p. 253: contents previously described in Sassoon collection (1932) and at Sotheby's auction catalogue (1984); written in an early Spanish hand, probl. 14th century (notes that Sassoon catalogue says two or three hands and that Vienna Hebrew 132 is the only other copy of this text ('is of the same physical description') which Langermann thinks is by the same hand

lists contents; re: section 9 (pp. 116-44); rare, partial copy of the identical catalogue in Vienna Ms Heb 132 (Schwarz 185) ff. 64a ff. both are illustrated, which make them unique in the Hebrew manuscript tradition; notes that Hebrew star lists exist in three forms: translations from Latin; transcriptions of Arabic words and original Hebrew works written by Jews; most are short as were intended for astrolabes; and connected to lunar mansion tradition;

p. 261: other examples Paris BN Heb 1100, Ptolemy Almagest, Arabic in Hebrew transliteration (ed. Kunitzsch 1986 = a)

Munich 126, 74a-91a = Hebrew Alfonsine catalogue

Budapest Kaufmann A518, pp. 149-83 = Hebrew Alfonsine catalogue

Parma De Rossi 749 = 75 star list (20 June 168)

p. 261: Vienna Hebr 132 = believes same scribe and same artist, despite variants; both written in same Spanish hand and dated c. 1391; both on vellum;

quite a few mistakes and text suggests that relied on an Arabic source (either directly or via Latin translations); discussion of 15 bright stars;

pp. 276ff (Kunitzsch): catalogue calculated for the epoch 1391, with a constant of  $18;28^{\circ}$  added to the longitudes for precession; drawing follow the style of those that accompanied al-Sufi; suggests that derive from a globe or from a ms from the *Sufi latinus* tradition - though does not follow the *Sufi latinus* tradition of copying 16 from the celestial globe view and 32 from the sky-view, but all but five of the ms drawing are sky-view (globe-view = OPHIUCHUS, SERPENS, EQUULEUS, ANDROMEDA and CANIS MINOR).

pp. 282-85 (Fischer): misleading.

*Convivencia: Jews, Muslims, and Christians in medieval Spain* [exhibition catalogue, New York, The Jewish Museum], New York 1992), no. 26.

*Transformation of knowledge: early manuscripts from the collection of Lawrence J. Schoenberg* (London 2006), pp. 66-67 (LJS 57).

associated with court of Peter IV of Aragon; opens with calendar compiled for the king in 1361 by Jacob ben David ben Yom Tov (subsequently translated into Catalan for the king's use); miscellany of 4 astronomical texts and a Hebrew translation of Ptolemy's *Almagest*; 48 gold and polychrome miniatures; very fine Sephardic cursive script (several scribes) with decorated headings

DEKKER 2013, pp. 459-61.

with illustrations of the hemispheres

the oldest hemispheres in this format; quality suggests that are a copy of a mathematical example; no stars are marked; design of constellations suggest that not a direct forerunner of the Vienna maps (see pp. 367-78 re: Vienna ONB 5415); and notes that some figures have Western elements, including the style of the clothing; all figures are dressed except Gemini; notes that there is no tradition for Islamic maps in this format, therefore possibly copied from some European text; but equidistant projection does not necessarily point to a map tradition ; more likely to be a copy from a celestial globe; rare evidence of otherwise unknown cartographic tradition in Jewish circles in 14th-century Spain.

from website: <http://hdl.library.upenn.edu/1017/d/medren/4852174>:

#### codicology

- size 114 leaves : parchment, col. ill. ; 275 x 204 (190 x 132) mm. bound to 288 x 224 mm.
- foliation Parchment, iv (modern paper) + 114 + iv (modern paper; [1-228]); modern pagination in pencil, upper outer corners.
- layout Text written in 2 columns of 37 lines; some leaves ruled in faint ink.
- script Written in Sephardic cursive script by multiple hands, one perhaps of a scribe named Moshe (p. 2); headings written in square script.
- decoration 2 full-page colour illustrations in gouache and ink of constellation maps (p. 112-113); 43 smaller illustrations of constellations in gouache and ink with gold bezants for stars (p. 117-144); panel headpiece in interlaced red and green penwork and full border of gold bezants flourished in coloured ink (p. 1); numerous full-page diagrams and tables in red and brown ink; Gothic penwork infilling frames on some tables (p. 196-211); headings in red or green ink.
- binding Modern blind-stamped morocco, with 2 sets of clasps and catches.

#### contents

A collection of astronomical texts, including a copy of a treatise on the calendar originally compiled for Pedro IV, King of Aragon, with an almanac of oppositions and conjunctions of the sun and moon and predictions of lunar and solar eclipses; four short works by the 12th-century scientist Abraham Ibn Ezra on an introduction to astrology, choosing the most auspicious moment for a given activity, the zodiac, and astrology concerning humankind collectively; and a Hebrew translation of Ptolemy's *Almagest*, with numerous tables, diagrams, and illustrations.

- pp.1-23 [Treatise on calendar and leap years / Jacob ben David ben Yom Tov]
- pp.25-60 [Reshit hokhmah (Beginning of wisdom) / Abraham ben Meir Ibn Ezra]
- pp.61-68 [Sefer ha-mivharim (Book of elections) / Abraham ben Meir Ibn Ezra]
- pp.69-86 [Mishpetei ha-mazalot (Book of the judgments of the zodiacal signs) / Abraham ben Meir Ibn Ezra]
- pp.86-93 [Sefer ha-'olam (Book of the world) / Abraham ben Meir Ibn Ezra]
- pp.93-228 [Hebrew translation of *Almagest* / Ptolemy]

#### provenance

Formerly owned by David Solomon Sassoon (Ms. 823), probably purchased in the mid-1920s.

Sold as part of his collection at auction at Sotheby's (Zurich), 5 Nov. 1975, lot 15.

Formerly owned by the Carl Alexander Floersheim Trust for Art and Judaica (Bermuda).

Sold at auction at Sotheby's, 10 Dec. 1996, lot 48, to Lawrence J. Schoenberg.  
Deposit by Lawrence J. Schoenberg and Barbara Brizdle, 2011.